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Debate on the Advisory Board

ALTHOUGH last week's debate in the House of Commons arose from the Opposition's disapproval at the lack of trade union representation in the Special Advisory Group recently appointed to help the British Transport Commission, discussion mainly centred on the actual necessity for the Group's appointment, the function the railways should play in the transport system, and transport policy in general. The Advisory Group has been set up under the chairmanship of Sir Ivan Stedeford, Chairman & Managing Director of Tube Investments Limited, to examine the structure, finance, and working of the Commission's activities in the light of the Prime Minister's recent statement. This covered adjustment of their size and pattern, more effective distribution of functions, better use of assets, and decentralisation to the extent that the various Regions become self-accounting and, in so far as is practicable, responsible for their own management. The House felt that the Government must act to ease the present railway burden on the taxpayer but was divided on the means to be adopted. Mr. Ray Gunter, President of the Transport Salaried Staff Association, thought the railways' task must be defined before its structure could be decided. This definition must come from the Government and from the Government alone. Continual progress has been made toward decentralisation by British Railways since its recent Government-instigated reorganisation. Complete decentralisation would require a new Railway Clearing House: an institution not notably economic. Further, and again on Government advice, the Commission has already reassessed its modernisation plan and has made fresh estimates of its prospects. These estimates can be adjusted to include the new commitments implicit in the Guillebaud proposals. The reappraisal foreshadowed a financial reconstruction which will now be carried out with open recognition of the fact that present deficits are to be met directly and not by a so-called loan which everyone knows will never be re-paid. In these circumstances, advice on its future capital structure is probably more important to the Commission than advice on organisational reconstruction—a problem it can itself solve in consultation with the Ministry of Transport. The Minister, Mr. Ernest Marples, expressed the view that " the main job is the organisation of the management structure of British Railways from the business point of view." He doubted whether the Commission could undertake the work which had been entrusted to the Group, because it would be a judge in its own cause and also it might be better to have an outside view.

Financial Considerations

THE debate gave little time to the aspect of financial considerations, and the Government apparently intends to leave this aspect of the problem until the nature of the structural changes has been decided. Meanwhile, the Commission is to live what amounts to a day-to-day existence, the recipient of piecemeal recommendations by the Special Advisory Group, with which it will be in continuous consultation. Sir Ivan Stedeford, who held the first meeting of the Group on April 12, has said he will consult the Commission and the railway trades unions separately or together, according to choice. Before the Government takes a decision, the unions will again be consulted. The Commission has assured Mr. Marples of its absolute co-operation. All this is good, so far as it goes. What is not so satisfactory is the news that no reports are to be published by the Advisory Group. A primary duty of this body is to complete its task as soon as possible and then to disband. Only then will the Commission be able to carry out its appointed work unhampered by outside interference.

Mr. S. A. Fitch

MR. S. A. FITCH, Assistant General Manager (Traffic) of the Southern Region of British Railways, whose death at the age of 63 took place on April 19, was a man of quiet courtesy, kindliness, and great modesty. He was also a traffic officer of great capability and experience. He served with distinction in both wars; in the first, he was awarded the Distinguished Conduct Medal and the Military Medal and, in the second, the O.B.E. " in recognition of gallant and distinguished services in North-West Europe." Reserved and a trifle austere, he disliked any form of ostentation; he asked us once not to append his decorations and honour when referring to him editorially. He was held in great personal esteem by his staff and, although his characteristic reserve made it difficult for him to enter into close friendships, he was well liked and respected by everyone with whom he worked, both on the Southern Region—which was his natural homeground—and on the London Midland Region, on which he served from 1949 to 1954.

I.U.R. Board of Management

THE comprehensive functions of the Board of Management of the International Union of Railways (U.I.C.) are shown in the agenda and decisions of the recent meeting in Paris. A brief account is given elsewhere in this issue. The most notable question discussed was perhaps the extent to which manufacturers of motive power, rolling stock, and other railway material should be consulted in formulating U.I.C. specifications. The Board also considered the sale of manufacturing rights for standard diesel locomotives. The agenda otherwise covered the several aspects of railway activities, including the operation of through goods trains and other

ways of improving international services. Creation of the Federation of Mali, in West Africa, resulted in admission to the U.I.C. of the railway system in that new State. Mr. John Ratter, a Vice-Chairman of the Board of Management of the U.I.C. and Member of the British Transport Commission, who takes office as President of the Union next December, represented Great Britain.

Railway Construction in China

MR. LU CHENG-TSAO, Deputy Minister of Railways, in a recent address to the People's Congress in Peking, stated that 5,500 miles of railways are to be built this year. He also stated that China's first electrified railway between Paoki and Fenhsien in the north-west, which was devastated by floods and landslides immediately after the formal opening a few years ago, and which had to be rebuilt, would be open to traffic this year. Most of the intensive and difficult tunnelling required in building the south-western railways has recently been completed. When the railways have all been built, Hongkong which is now linked *via* Canton with the national network, will also be directly linked with a rich region which was mostly destitute of railways before the People's Government was instituted. The Minister stated that 7,000 miles of narrow-gauge branch lines were also being built. It is also reported that the Hongkong section of the line to Canton will be extended to Tsunwan industrial area by a spur from the northern end of the Kowloon tunnel.

Overseas Railway Traffics

SOUTH AFRICAN Railways & Harbours revenue from railway operations during January amounted to £14,657,857 compared with an expenditure of £14,353,295. The net revenue from all sources resulted in a surplus of £652,118. This brings the accumulated surplus for the first 10 months of the financial year (April, 1959 to January, 1960) to £3,073,762 less the deficit carried forward from the previous financial year of £346,890, giving a net surplus of £2,726,872. Costa Rica Railway receipts for February amounted to colones 2,611,740 compared with colones 2,293,928 in February, 1958, an increase of colones 317,812. Aggregate receipts from July 1, 1959, to February 29, 1960, amounted to colones 17,517,173 compared with 15,533,821 in the corresponding period of 1958–59. Net railway earnings of the West of India Portuguese Guaranteed Railway Co. Ltd. continue to show considerable improvement in comparison with the previous year's figures. The improvement is mainly attributable to better goods receipts. At the end of March, aggregate earning from all sources were contos 23,639 compared with contos 14,125 in the corresponding period of the previous financial year, an increase of contos 9,514.

Continuous Rails in Malaya

EXTENSIVE use is being made by the metre-gauge Malayan Railway of rails welded into continuous lengths. Many miles of track between Kuala Lumpur and Ipoh have been re-laid with rails flash-butt welded at the permanent way depot at Sentul into 480 ft. lengths. These continuous lengths were thermit-welded into 960 ft. lengths in the track. Re-laying also has been carried out with 40 ft. rails which were thermit-welded in the track. Much of this latter work has been concentrated on sharp curves and lengths needing strengthening to deal with the increased forces exerted by the English Electric 1,500 b.h.p. Co-Co diesel locomotives. It was begun on the East Coast line across the peninsula. Movement of the 480 ft. lengths to site presents little difficulty, despite some fairly sharp curves. Each train of special flat wagons conveys 24 lengths. At the re-laying site the ends of two rails are anchored to the track with chains and the train draws away.

Facing Crossovers on N.E. Region Main Line

TO minimise delays to trains on lines where engineering work is in progress and to avoid interruption of the work, British Railways, North Eastern Region, is laying as an experimental measure crossovers in a facing direction on the double-track East Coast main line between Newcastle-on-Tyne and Berwick. This eliminates the stop and reversal necessary with existing crossovers, which are normally laid in the trailing direction. Engineering work in connection with the installation of colour-light signalling and also track strengthening and bridge reconstruction for high-speed running and other permanent way improvements will be fairly considerable on this section of main line during the next five years. Twelve sets of the new crossovers, approximately four miles apart, are being installed and consideration is being given to the new arrangement being extended to other important sections of line. The cost to British Railways of delays, which lose much goodwill, is great, and no doubt justifies the considerable expense of installing facing crossovers.

End of Steam on the Canadian National

THE last steam locomotive will be withdrawn from service this summer by the Canadian National Railways. The company and its predecessors have used steam locomotives ever since the first engine was placed in service in Canada 124 years ago. The Canadian National has been a pioneer in developing diesel-electric traction, and in June it will be the first major Canadian railway to complete its programme of turning over from steam to diesel. The management points out that diesel-electric haulage has proved to be cheaper and faster, and to require less maintenance and manpower and result in lower long-term repair costs and greater use of motive power. Public acceptance of the diesel is based on its speed and smooth starting and stopping. The C.N.R. will have 2,144 diesel locomotives and 28 " railiner " railcars by June, representing an investment of $397,000,000. Only 40-odd years ago the Grand Trunk Railway, a component of the Canadian National, was famed for its green locomotives of somewhat British appearance.

Better Results for C.I.E.

THE Chairman of Coras Iompair Eireann, Dr. C. S. Andrews, has told senior staff of the undertaking that during the year ended March 31, 1960, very considerable progress has been made towards enabling C.I.E. to pay its way; the year was the first of the five allowed for this purpose under the Act of 1958. Progress was the result mainly of a remarkable increase in revenue, amounting to over £800,000 compared with the preceding 12 months. Much of the increased revenue was due to the successful exploitation of the commercial freedom conferred on the Board by the Act. The total loss on the year's working has been reduced to some £700,000, an improvement of well over £1 million on the previous year's figures. There is no reason, he believes, why this improvement cannot be maintained, in which case the objective may be attained well before 1964. The General Manager, Mr. Frank Lemass, has reported net receipts of over £500,000 in operation of the whole undertaking. Every department contributed to this improvement. As regards the railways, a combination of increased revenue and decreased expenditure reduced the loss of £1,200,000 to just over £500,000, an improvement of £700,000. There has not been time for these figures to reflect to any significant extent the economies effected by the substitution of road for rail services on branch lines.

Pre-stressed Concrete Sleepers in U.S.A.

THE latest tests of pre-stressed concrete sleepers in America are both with Type " E "; one is on the Seaboard Airline Railroad and the other on the Atlantic Coast Line. The " E " is the fifth experimental design evolved by the Director of Engineering Research of the Association of American Railroads. To reduce frost damage, this sleeper is made with air-entrained concrete and is such that a 2-ft. 6-in. sleeper spacing between centres is possible as compared with the orthodox American 1 ft. 8 in. spacing. It is 8 ft. 6 in. long, 7 in. deep and weighs 540 lb. The outer 2 ft. 9 in. has a 12-in. bearing base and a 9 in. top width. The central 3-ft. length has a bearing width of only 2 in. to reduce tendency to centre-binding. The bottom bearing surface of the sleeper is slightly concave to increase ballast holding. The pre-stressing is effected with four $\frac{7}{16}$-in. uncoated, stress-relieved, seven-strand wires with a maximum ultimate strength of 250,000 lb. per sq. in. and an initial prestress of 197,500 lb. per sq. in. The

specified minimum compressive strength of the concrete is 4,000 lb. per sq. in. at prestress and 6,000 lb. at 28 days. The tests are under long-welded 130-lb. and 115-lb. rails secured to the sleepers with spring clips; 5 in. wide bearing plates with plywood or polyethylene plastic pads are used.

Safety of Bridges in India

IN March, 1957, the Government of India set up a committee of engineers under the chairmanship of Dr. A. N. Khosla, Vice-Chancellor of Roorkee University, to investigate and review methods of estimating maximum flood discharges from catchment areas necessary for the design of bridges. It was also to indicate measures to ensure safety of railway bridges against failure of various "railway affecting" works, which are taken to mean extraneous works by other than railway agencies, threatening railway safety. After 2½ years' research and deliberation the committee submitted its report in October, 1959. The principal measure recommended is the systematic country-wide establishment of automatic rain—and stream—gauges to arrive at better results than those existing and based on empirical formulae. Another recommendation is that foundations and protection works should be designed for larger than maximum-recorded floods. A uniform procedure of notification, inspection, and warnings in connection with "railway-affecting" works in the form of a manual is suggested.

Track Capacity on a French Single Line

THE French National Railways main line between Dole and Vallorbe carries international traffic which is particularly heavy at certain seasons. This section was electrified in 1958, using the standard 25,000-V., 50 cycle supply. The physical features of the line precluded the installation of overhead traction equipment over certain sections of the existing double track, and it was decided to convert these sections to single track and place the contract equipment centrally to give the necessary clearances for overhead equipment. This has been done, without loss of track capacity, by the introduction of electronic remote control and programme storage signalling equipment. The new signalling is described elsewhere in this issue. A remote control room has been built at Mouchard, and this will eventually control the whole route. Nine local relay installations, of the standard French bush-button type, known as P.R.S. (*poste tout relais à transit souple*), were brought into service before remote control was superimposed. Four stations are at present still operated by station staffs, but will not be brought under the remote control until a considerably later date.

Signalling for Monorail Railways

A DIFFICULTY met with on special forms of railway, particularly the mono-rail, apart from the major one of constructing "points," is that ordinary track circuit control of automatic signals is not practicable. For the remarkable Barmen-Elberfeld suspended railway in Germany, the first section of which was opened in 1901, an intermittent contact system of signal control was designed by an inventor named Natalis. This was described in our issue of October 18, 1935. The development of electronic apparatus and methods of receiving coded current impulses inductively have opened the way to obtaining a greater degree of security and especially of overcoming the risks arising if a train is obliged in some emergency to enter an occupied section. An arrangement using a continuous additional conductor combined with an inductive tail-signal coil and picking up three-aspect cab signal indications has been applied on an American mono-rail line, an interesting example of the application of modern devices to a special problem.

Electric Locomotives for British Railways

DELEGATES to the Institute of Transport Congress, to be held in London next week, will have an opportunity to inspect one of British Railways, London Midland Region, Type "A" a.c. electric locomotives at an exhibition of rolling stock which is being staged at Marylebone Goods Depot on April 27 and 28. It is the first of ten 25-kV. electric locomotives ordered from the General Electric Co. Ltd. to be used for the main-line service between London, Manchester, and Liverpool, after electrification at 25 kV. 50 cycles a.c., and like others in its class it will be suitable for use in the later development of main-line electrification elsewhere. A feature of the locomotive is the use of the Com-Pak single-anode mercury-arc rectifier developed by the G.E.C. It is an excitron as small as existing traction ignitrons, and has an arc-drop which is stated to be half the best figure quoted generally for the ignitron type. Liquid cooling is used to meet the traction duty requirements of minimum size and stability in operation.

Institute of Transport Congress

SPECIAL significance attaches to the Institute of Transport Congress, 1960, to be held in London next week, in that it takes place in the 40th year after the resolution to found the Institute was adopted in November, 1919, by leading representatives of the transport world under the chairmanship of Sir Albert Stanley (later Lord Ashfield) and after the inaugural meeting of the Institute on March 22, 1920, at which the first Minister of Transport, Sir Eric Geddes, delivered his Presidential address entitled "Transport and the State." The current year is of the utmost importance for transport in Britain. Changes are taking place or are impending in the organisation and structure of many different undertakings, publicly and privately owned, and more especially in the State-owned railway and other undertakings under the aegis of the British Transport Commission. Technical developments occur with increasing frequency. It is fitting, therefore, that the meeting to be held on April 26–29, should be in London, the focus of transport in the United Kingdom and a commercial centre in which to see, and from which to visit, transport installations of all kinds. This is the first time that such a gathering of the Institute is to be held in London since the war. Congresses were held in Buxton in 1949, Torquay in 1951, Glasgow in 1953, Southport in 1956 (postponed from 1955 because of the railway strike) and Dublin in 1958.

The programme of meetings and visits published in our March 4 issue shows the wide range of interests catered for. The support of the Government is indicated by the performance of the opening ceremony on Wednesday morning by the Minister of Transport, Mr. Ernest Marples. This will take place in the Waldorf Hotel, Aldwych, W.C.2, where the papers will be read and discussions held. Three papers are to be given. The first of these entitled "The State and transport economics," is by Sir Gilmour Jenkins, lately Permanent Secretary to the Ministry of Transport & Civil Aviation and a Past President of the Institute. This takes the place of the paper "Some thoughts on the future of inland transport," which was to have been given by Sir Brian Robertson, Chairman of the British Transport Commission. Time presumably allows for only one paper on land transport, despite the many important questions in this large field. The other two papers are concerned with sea and air: "British Shipping—a national service or a commercial enterprise ?" by Sir Donald Anderson, a Past President of the Chamber of Shipping of the United Kingdom; and "British Transport aeronautics—looking ahead," by Mr. Peter Masefield, another Past President of the Institute and President of the Aeronautical Society.

In the field of railways there was much to see on visits during previous congresses, more especially perhaps at Glasgow in 1953 and Dublin in 1958. Apart from the advantages of London and its environs as a transport centre, the visits to railway installations this year are of particular interest because of the progress made in the re-equipment and modernisation of British Railways and the London Transport Underground.

Little of what can now be seen was visible, say, two years ago. Opportunities will be given, for instance, of inspecting the flyover and other engineering works at Barking in connection with electrification of the London, Tilbury & Southend Line of the Eastern Region. The new electric car sheds at Ilford, on the Great Eastern Line of that Region, also will be visited, with a view of the new Temple Mills marshalling yard *en route*. Recent developments in signalling techniques can be inspected on the visits to the Western Region Signal Works at Reading, to the L.T.E. Northern Line signalling installation at Leicester Square, and to the frame and relay room at Sittingbourne signalbox, in the course of a trip on the Kent Coast main line of the Southern Region, electrified last year. The carriage

cleaning depot at Willesden, London Midland Region, is another recently completed installation with no parallel outside London and the Home Counties.

All the other visits are of interest to railwaymen, because they show the way in which traffic is handled by other forms of transport, as at three British Road Services Depots and at London Airport, or mechanical and other technical work performed, as at the L.T.E. bus works at Aldenham; or because they are concerned with traffics handled by railways, such as oil, to be seen at the British Petroleum refinery on the Isle of Grain, or the merchandise dealt with at the S.P.D. Limited distribution depot at Salfords, Surrey. There will also be opportunities of seeing how active is the Commission in producing railway documentary and historical films and in preserving historical railway relics in the new depot at Clapham. The exhibition of British Railways motive power and passenger and freight rolling stock at Marylebone Goods Depot on Wednesday and Thursday will display achievements in design and workmanship.

The Congress is an invaluable opportunity for railwaymen to meet and discuss problems with operators of other modes of transport, and for men concerned with transport to meet —not only from all parts of the British Isles, but also from overseas.

Western Region Summer Timetables

WITH the introduction of the summer timetables on June 13, two long-established Western Region trains will cease to run: the 12.30 p.m. from Paddington to Yeovil and Weymouth, and the 4.15 p.m. from Weymouth to Paddington; there will still, however, be a 4.15 p.m. from Weymouth to Westbury. With the transfer of the Channel Islands boat trains to the Southern Region route, in future the only remaining Western Region through trains between London and Weymouth will be the 9 a.m. from Weymouth and the 6 p.m. from Paddington.

As compensation for certain intermediate stops made by the withdrawn trains, the 1.30 p.m. "Royal Duchy" from Paddington will call additionally at Newbury (2.34/2.36 p.m.), and the 1.20 p.m. from Penzance to Paddington at Westbury (7.8/7.11), Newbury (7.58/7.59) and Reading (8.23/8.25 p.m.); the latter will be accelerated 10 min. between Plymouth and Taunton, so leaving Taunton 10 min. earlier, at 6.15 p.m., but will be 5 min. later into Paddington, at 9.5 p.m. The up "Royal Duchy" will reach Paddington 5 min. earlier, at 7.10 p.m.; in the down direction its arrival at Plymouth will still be at 6.25 p.m., despite the Newbury stop.

On the Bristol main line the 7 a.m. from Weston-super-Mare to Paddington will leave Bristol 5 min. earlier, at 7.40 a.m. and call additionally at Didcot (9.2/9.4 a.m.), instead of slipping a coach there; the Paddington arrival will be 10 a.m., as now. By the withdrawal of this slip coach, the once numerous Great Western slips will dwindle to one only, detached at Bicester from the 5.10 p.m. from Paddington to Wolverhampton. A change of the Western Region timetable format is the transfer of the service between Didcot and Oxford from the Paddington-Birmingham-Birkenhead table to that between Paddington, Swindon and Bristol, which is an improvement. As the "Bristolian" continues on its 105-min. schedule in each direction, since its temporary acceleration to 100 min. last summer, the fastest schedule in the Region, and also in Great Britain, will still be that of the 1.50 p.m. from Bristol to Paddington, over the 41.3 miles from Swindon to Reading in 36 min. start to stop (68.8 m.p.h.).

On the Worcester main line the title "Cathedrals Express" will revert to the 7.45 a.m. from Hereford (8.55 a.m. Worcester) to Paddington and the 4.45 p.m. from Paddington to Worcester and Hereford. It is hard to see why it should have been transferred during the winter to the 9.50 a.m. up and the 2.45 p.m. down. On the Birmingham main line the withdrawal of the 12.10 p.m. from Paddington to Wolverhampton and the 12.35 p.m. from Wolverhampton (1 p.m. from Birmingham) to Paddington is made permanent; this is the only interruption in the hourly express service throughout the day in each direction. For the same reason the recently-introduced Banbury stop of the 8.55 a.m. from Birkenhead to Paddington is to remain. The 7.45 a.m. from Birkenhead to Paddington will start at 7.35 a.m., but the times from Wolverhampton onwards will be unchanged.

Reconstruction of Manchester London Road Station will affect the north-to-west expresses serving that city. Most of them will be diverted to and from Manchester Central. The principal morning express from Manchester to the West of England, however, will start, unusually, from Manchester Exchange, at 10.29 a.m., compared with last summer's 10.45 a.m. from London Road. This is the fastest train of the day, with advertised stops only at Stockport, Crewe, and Shrewsbury between Manchester and Bristol. Among other cross-country trains the 3.10 p.m. diesel train from Carmarthen to Birmingham will start at 3 p.m., call at all stations to Swansea, and leave there at 4.10 p.m., as now.

The Canadian Pacific Railway in 1959

WE have received from Mr. N. R. Crump, President, a copy of the 79th annual report to the shareholders of the Canadian Pacific Railway Company signed by him on behalf of the Directors; it covers results and developments in 1959. The C.P.R. continued to improve and adjust its properties and services to meet changing requirements and to achieve increased efficiency. The diesel traction programme was brought close to completion, plans were advanced for new freight marshalling yards, C.T.C. signal systems were installed in new areas, piggyback services were extended, and the new service integrating the handling of merchandise traffic was introduced in British Columbia.

In May a Royal Commission was appointed to inquire into problems relating to railway transportation in Canada and the possibility of removing or alleviating iniquities in the freight rate structure. The C.P.R. considers that the only serious iniquity is that arising from fixed statutory rates on grain and grain products. The revenues received at these rates fall far short of just and reasonable remuneration for the handling of this traffic. Accordingly the C.P.R. has submitted to the Commission a plan which will maintain for Western grain growers the present level of freight charges on grain and grain products moving to export positions in Western Canada and at the same time provide the railways with compensation based on just and reasonable rates. Under this plan the difference is to be assumed by the Government of Canada as necessary assistance from the people of Canada to Western grain growers.

Although 1959 witnessed a resumption in the upward trend of Canadian business activity which had been interrupted during the previous two years of recession, the C.P.R. did not participate fully in this recovery. Freight revenue was adversely affected by strikes in the steel industry in the United States and in the forest industry in British Columbia.

Railway revenue increased 2 per cent over 1958, largely as a result of higher freight rates, while expenses increased 3 per cent mainly because of increased labour costs. Net earnings were therefore slightly below those of 1958, and provided a return of only 2.7 per cent on net investment in railway property.

Some of the principal results in 1959 as compared with those in 1958 are given below:

	1958	1959
	$	$
Railway passenger revenue	35,394,437	33,212,415
Railway freight revenue	393,823,285	406,485,538
Railway gross revenue	467,410,853	477,805,874
Railway working expenses	430,919,006	441,759,581
Railway net earnings	36,491,847	36,046,293
Other income	13,408,712	12,677,751
Fixed charges	16,997,521	17,435,113
Net income	32,903,038	31,288,931
Dividends	24,286,501	24,526,950
Balance	8,616,537	6,761,981

The programme of conversion from steam to diesel motive power was brought closer to completion with the purchase of 65 diesel units, consisting of 51 road switchers, 35 of which were for branch line operations, and 14 yard switchers. At year end there were 1,009 diesel units in service. New freight train wagons placed in service totalled 1,955, of which 500 were box wagons specially equipped for heater service, 500 were combination auto-box wagons and 300 were flat wagons equipped for piggyback operations.

The track replacements programme included the laying of 543 miles of rail, the installation of 1,600,000 sleepers, and the application of rock and gravel ballast to 653 miles of track. Automatic block signals were installed on 184 miles of road, bringing the total mileage so equipped to 3,451. The installation of the C.T.C. system on a section of main line between Montreal

and Toronto was extended and is now in operation over a distance of 129 miles. Similar installations were completed on a 65-mile section of main line in Saskatchewan and on 23 miles in British Columbia, permitting the removal of one of the two main tracks formerly used in those areas.

During the year, 557 new manufacturing, warehousing, and distributing facilities were located on or adjacent to the lines of the C.P.R. Of these, 159 required industrial trackage and a total of 29 miles of sidings was constructed to serve them. Grading was started on the new automatic hump yard near Toronto and the new marshalling yard near Saint John. Construction was completed on a building to house communication offices and equipment at Kamloops, and office and terminal facilities for Merchandise Services were constructed and put into operation at Victoria, Nanaimo, Port Alberni, and Vancouver.

Piggyback service continues to be extended as the advantages of this form of transport are made known to increasing numbers of road haulage operators. Close to 900 specially equipped flat wagons are now in use over a route pattern extending more than 6,000 miles, serving 28 terminals from the Atlantic to the Pacific. The C.P.R. is also continuing to enlarge the haulage of its freight and express traffic in its own trailers.

Under the newly established Merchandise Services Department the handling of rail, road, sea, and air merchandise traffic was put on a fully integrated basis in certain areas of British Columbia. The success of this operation has given added impetus to plans for its gradual extension to other parts of Canada served by the C.P.R. With a view to simplifying operations and introducing further economies, a coast to coast reorganisation of territorial administration was effected on July 1. The former eight districts, which reported through three regional headquarters, were replaced by four regions which have direct control over 31 operating divisions. It is expected that these changes will produce substantial savings and increased efficiency.

Telex, the service which enables rapid printed communication between subscribers, and which is operated jointly with Canadian National Railways, was extended to a number of new areas in Canada and, through arrangements with Western Union Telegraph Company, to additional points in the United States. Work was commenced during the year on the extension of the television network, operated jointly with C.N.R. from Rimouski eastward to Moncton. It is expected that the section between Rimouski and New Carlisle will be in service by June of this year and the remaining section to Moncton will be completed late this year or early in 1961.

With the opening in February last year of the 400-room air-conditioned extension, the number of rooms in the Royal York Hotel was brought to 1,600, making it the largest hotel in the British Commonwealth. Convention facilities of the hotel were doubled, and its distinctive Canadian decor has been the subject of much favourable comment. During the year the Emerald Lake Chalet and Moraine Lake Lodge, both summer resorts in the Canadian Rockies, were sold and the operation of the McAdam Hotel in New Brunswick was discontinued. A programme to replace existing furniture with furniture of modern design in guest rooms in C.P.R. hotels across Canada was begun with the renovation of 495 rooms in 1959. This programme will take between four and five years to complete.

Prospects for the Signalling Profession

SINCE the last war the efficiency of railway signal officers is reflected in the decrease in failures per unit of signalling apparatus. Apart from safety there are two main objectives which the signal engineer has to face: reduction in the number of signal failures and economy in the capital and revenue costs of signalling installations. These are points brought out by Mr. W. Owen, Senior Executive Assistant in the Signal Engineer's Department, London Transport Executive, in his Presidential address to the Institution of Railway Signal Engineers at the annual general meeting on April 6.

Reduction in maintenance costs, he observes, often brings an increase in the number of signal failures. On the London Transport Underground there were 0.153 failures per unit of apparatus in 1933 and 0.024 failures per unit per annum in 1959. The redesign of existing apparatus and equipment have contributed considerably to reduction in failures. Apparatus today is planned, he states, so that it can be installed with the assurance that it will function for a pre-determined period with the minimum of maintenance and without repairs at site. Electrical connections are arranged so that wires need not be removed from apparatus terminals and the fixing of the equipment is such that rapid replacement will not be effected during busy traffic. Mention is made of some of the important units in the London Transport signalling system specially designed to avoid removal of wires and permit easy exchange with a similar component. Train stop equipment is now produced, he points out, with all parts enclosed in one case; the working parts are automatically lubricated from a reservoir contained in the unit. To combat the effects of snow and ice bellows are fitted which prevent compaction of snow. With the newer type of train stops, apart from air and electrical connections, only four nuts need be removed and replaced when mechanisms have to be exchanged.

After describing point heaters and other items of standardised equipment, Mr. Owen considers the future of railway signalling. He stresses the need for intensifying the education of the younger members of the profession and expresses the hope that in the not too distant future there will be a comprehensive signalling course at technical institutions culminating in a diploma comparable with the National Certificate in Electrical and Mechanical Engineering.

A Time of Fluctuating Railway Traffic

(*By a correspondent*)

COMPARED with 1959, British Railways raised freight train traffic receipts by £1,103,000, or 5 per cent, in January, only to record a decrease of £562,000, or 2·5 per cent, in February. They carried 10,000 more tons of merchandise in February than in the January period and 258,000 more tons of coal, but 181,000 fewer tons of minerals, a total increase of 87,000 tons, or 0·4 per cent. The changes in traffic involved the working of 59 million more ton miles than in January, a 4 per cent addition to the amount of work then done. The cost of working is likely to be high this year, apart from the effect of advances in salaries and wages.

Though the total February tonnage of 20,703,000 was 545,000 tons, or 2·7 per cent, up on 1959, it was 2,365,000 tons, or fully 10 per cent, below the second four-week period of 1953, the peak year of our railways. In February the railways worked 1,550 million ton miles, against 1,842 million in 1953, a difference of 292 million or 15·5 per cent. The regional results in February were far from uniform. The North Eastern originated 419,000 tons, or 9 per cent, more traffic and worked 11,085,000 more ton miles (5·7 per cent). The London Midland lost 58,000 tons of traffic (1 per cent), but worked 34 million more ton miles (6·7 per cent); an exceptional rise of 249,000 tons (19 per cent) in mineral tonnage led to an increase of 23 million (21·5 per cent) in mineral ton miles, while an increase of 17,000 tons in merchandise (1·9 per cent) produced 13,260,000 more ton miles (9·9 per cent). These increases in tonnage were outweighed by a decrease in coal and coke of 319,000 tons, or 8·7 per cent. The consequent fall in coal ton miles is given as 2,500,000, or 0·9 per cent.

If that estimate is correct, there has evidently been a great change in the distribution of coal and coke. The tendency recently was for coal ton miles to decline faster than the quantity put on rail. When the London Midland lost 6 per cent of its coal traffic last year, it worked 8 per cent fewer coal ton miles. Though in February the North Eastern originated the largest regional coal tonnage of 3,644,000 tons, an advance of 273,000 tons, or 8 per cent, on 1959, it recorded only 2·4 per cent more ton miles. At the same time the Eastern forwarded 101,000 more tons of coal (4·6 per cent), but saved 11 million ton miles, nearly 7 per cent. The Scottish Region lost 162,000 tons, about 10 per cent of its February 1959, coal, with an economy of 11 per cent in ton miles. There is no obvious reason for the sudden change of trend in the London Midland Region.

For eight weeks to February 28, the aggregate of freight train traffic of all classes was 41,317,000 tons, an increase of 2,567,000 tons (6·6 per cent) on 1959. The rate of advance did not continue in the next four weeks to March 27, when freight train revenue was only £117,000, or 0·5 per cent, higher. That was a poor result for a month noted for heavy wagon loadings. Over six years from 1952 to 1957 the railways ori-

ginated on an average 23,080,000 tons in the third four-week period of the year. In 1960 industrial output was at a pinnacle, but, apparently, the railways did not recover much of the traffic lost in recent years.

So far this year passenger revenue has expanded by 7 per cent. The rise is due partly to the November advance in fares, as the decrease in passenger journeys, which began last year, may confirm. There was a decline of 785,000 journeys in January, due entirely to the loss of passengers paying full fares or taking early morning tickets. It is significant that 809,000 more first class passengers travelled last year, but in January, 141,000 fewer were booked, a decrease of 6.5 per cent. due probably to a 17 per cent rise in the average first class fare to 14s., compared with a 10 per cent rise in the second class payment to 2s. Unless the railways move cautiously, they may price themselves out of some profitable business.

LETTERS TO THE EDITOR

(*The Editor is not responsible for opinions of correspondents*)

Rail/Air Excursions to the Continent

April 11

SIR,—The lapse of a quarter-of-a-century and the intervention of a world war may have dulled memory, but I do not think it is correct to state, as you do in your issue of April 8, that the trips via Southend Airport are the first rail/air day excursions to be arranged in this country.

In the 'thirties, such excursions were operated via the former Bungalow Town Halt (appropriately re-named Shoreham Airport), making use of the flights of Railway Air Services and associated companies to the Isle of Wight and Bournemouth and, on Sundays, to Le Touquet.

As a matter of interest, one of the present officials of the Channel Air Bridge was on the staff of the Southern Railway Company during that period, and the recollection of what was done before the war may have acted as a stimulus to the initiation of the trips via Southend.

Yours faithfully,

J. H. BREBNER
Public Relations Adviser

British Transport Commission,
222, Marylebone Road, N.W.1

Victorian Government Railways

February 29

SIR,—Two mistakes unfortunately crept into the manuscript of my article on the Victorian Government Railways in your publication " Overseas Railways 1959."

In the second paragraph on page 37 the combined mileage of the diesel-electric fleet should have read " 20 million " instead of " two million."

The final paragraph on page 39 refers to the line from Melbourne to Albury being converted to 4 ft. 8½ in. gauge; actually a new line of that gauge is being built.

Yours faithfully,

E. H. BROWNBILL
Chairman of Railways Commissioners

Victorian Government Railways,
Spencer Street, Melbourne, C.1

First All Roller-Bearing Locomotive

March 14

SIR,—May I comment on Mr. C. P. Lovemore's letter in your March 11 issue?

If the number of years spent in pursuit of a hobby qualifies one to make corrections, I am qualified, for I have followed railway history, and been associated with the railway industry, for over 40 years.

Mr. Lovemore stated in his letter published on January 22: " I find it amazing that the railways of Britain should have been *so far behind* (my italics) those of other countries regarding this type of bearing." My letter in your February 26 issue dealt with this as a reference to chronology, and showed clearly that the railways of this country had been in the van rather than far behind.

Mr. Lovemore now treats the subject numerically, and in this respect nobody will disagree with him. It is not difficult, however, to find the reasons for the situation. A roller bearing really efficient for railway service was not available until the late 1920's or early 1930's. The roller bearing manufacturers of this counry were more than occupied with bearing supply during re-armament and the war years, and in consequence little attention could be given to the supply of axle-boxes until post-war years. Finally the unfortunate financial position of British Railways militated against heavy investment in roller bearings until the acceptance of the modernisation plans. The changed circumstances are to be seen in the fact Mr. Lovemore has noted that " only after the last war did roller bearings in any quantity begin to appear in this country for application to locomotives and rolling stock."

Yours faithfully,

J. T. EMMERTON

134, Tile Cross Road, Birmingham, 33

Power for Air Conditioning

April 8

SIR,—Mention is made in the editorial article " Rationalising Diesel Power Equipment," in your April 1 issue, of the paper by Lt.-Col. L. F. R. Fell. In this he quotes a figure of 25 kW. from a generator as being " the power to spare " on each vehicle of a 12-car train " for air conditioning."

I wish to draw attention to the question of power for air conditioning, because some engineers may be under the impression that much power is needed to provide the comfort of full air conditioning such as provided, for example, by the Stone-Carrier system. The power required for full air conditioning when cooling a vehicle operating under tropical conditions is approximately 14 kW. and for a coach in a temperate climate about 9·5 kW. The maximum power required for ordinary heating a similar carriage is, say, 18-20 kW.

I suggest that the " 25 kW. to spare " covers also the power for lighting and power for certain auxiliaries.

Yours faithfully,

J. F. B. VIDAL

Threeways, Wonersh Park, Guildford

The Great Northern Main Line

April 10

SIR,—May I thank Mr. G. F. Fiennes for his courteous letter published April 8. I am delighted to hear of the excellent punctuality record of the Eastern Region during the past three months, not only as being a desirable target in itself, but as strengthening my view that where the enthusiasm exists, steam can provide a service comparable with that provided by the new forms of motive power.

While admitting the financial arguments in favour of the present changes, when considering the railways as a whole and their relationship with industry, I still feel that the decision to eliminate steam entirely was premature, and may be regretted in years to come. It seems a great pity that research has not been directed to a greater extent into methods of eliminating smoke and dirt, not only from the lines but also from the sheds as this accounts largely for the unpopularity of steam. In general terms, there would appear to be a case for retaining steam on certain lines on which it would show to advantage, of which the Great Northern Line is one.

To revert to the original object of my letter of March 29: I still hope that the decision regarding the Welwyn Viaduct is not final, and that in due course quadrupling of the G.N. Main Line will be completed from Kings Cross to Stoke Tunnel.

Yours faithfully,

A. W. T. DANIEL

3, Hall Way, Purley, Surrey

THE SCRAP HEAP

Number Taking

A 15-year-old boy train-spotter stole an engine number-plate from Doncaster rail works, it was said recently at Doncaster Juvenile Court. He was granted an absolute discharge on payment of £1 costs.—*From "The Daily Telegraph."*

The Last Toll

A coach-and-four recently paid the last toll for crossing from the mainland to Hayling Island, Hampshire. Behind the coach came a cavalcade representing every type of vehicle since the bridge was opened in 1824. The toll, two George IV shillings, was collected by Mr. John Bastin, toll-keeper for 32 years. Mr. Bastin was afterwards presented by the British Transport Commission with a long service certificate before he retired from 50 years of railway service. The bridge was owned by the former London Brighton & South Coast Railway.

Expensive Ride

A man was recently fined £1, with three guineas costs, for permitting his dog to walk on a moving escalator at Notting Hill Gate Station, contrary to a London Transport Executive by-law. A woman ticket collector said that she shut the ticket barrier and told him to put the animal on a lead. The man knocked her arm away and passed through. He walked down the middle staircase and the dog went down the escalator. The man was also fined £5 for assaulting the ticket collector.

Serving Schools

(*See our April 1 issue*)

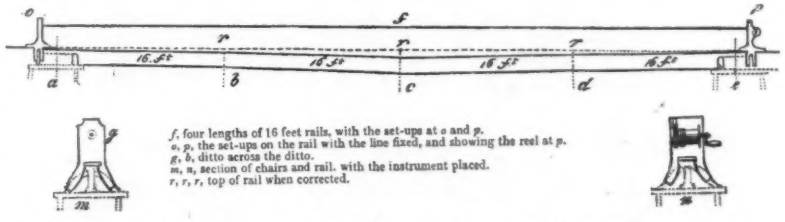
The author of a letter to *The Times* points out that the boys of Uppingham School will not be alone in their privilege of travel by special train over a line closed to ordinary passenger traffic. Passenger traffic was withdrawn some years ago from the line from Clapham (Yorks) to Low Gill. From Clapham to near Ingleton the line was part of the former Midland Railway, and northwards to Low Gill part of the London & North Western. The section, or the L.N.W.R. part of it, was known as the "Little North Western." Trains now run at the beginning and end of term for the girls of Casterton School. If Sedbergh School assembles or breaks up the same day, the Casterton girls have to share their special train with the boys of Sedbergh, which is served by Sedbergh Station, on the same line.

Railway Buffet Car on the Highway

A buffet kitchen car of British Railways was conveyed recently through the streets of Glasgow. The vehicle, of a new design by British Railways staff and recently completed by Cravens Limited, is being displayed by British Railways at the Food Exhibition in the Kelvin Hall, which opened on April 19. It was brought by rail from Derby to Stobcross Station, where it was taken off its wheels and jacked on to a British Road Services (Pickfords) Limited lorry. At Kelvin Hall the coach has been re-assembled on its wheels and placed on rails. Visitors to the exhibition can observe how the refreshment car staffs of British Transport Hotels & Catering Services carry out their duties. The car has no seating accommodation for passengers taking meals, but is arranged to serve 120 meals in adjoining coaches.

Platelayers Gradient Line (1841)

Laying railway lines to a given gradient, a correspondent states, presented a problem in 1841. Captain Francis DuBourdieu, of the Royal Hanoverian Engineers, and later of Innismore, Co. Armagh, invented an instrument for the purpose which was later improved upon by Matthew Qua. It consisted of two stands or "set-ups" which were clamped level to the table of the rails at a distance of five 16-ft. rails. Between these two set-ups a line was stretched. A reel and ratchet as illustrated in the contemporary diagram wound the line up tight. After setting two rails four or five rails apart to the check-level gradient, the rails between could be brought up to the required gradient. Our correspondent was allowed by a relative of Captain DuBourdieu to inspect the device in 1934. The "set-ups" were made of lignum vitae wood. The winding end or "set" had a reel of lignum vitae with brass ends and a ratchet toothed and pawled in gunmetal.


16.5ft
16.5ft
16.5ft
16.5ft
a
b
c
d
e
f, four lengths of 16 feet rails, with the set-ups at o and p.
o, p, the set-ups on the rail with the line fixed, and showing the reel at p.
q, s, ditto across the ditto.
m, n, section of chairs and rail, with the instrument placed.
r, r, r, top of rail when corrected.

Contemporary diagram of DuBourdieu gradient line for platelayers (1841)

"Chou-chou Special"

A nine-coach special train run by British Railways, Eastern Region, from Stratford to Clacton-on-Sea conveyed 450 members of the Church of England Hackney Mission on their Easter outing. The stock included three luggage vans, marked "strictly for Dancing." The repertoire of the club's three guitar-and-drum groups, which played throughout the 65-mile journey, included "Chou-chou Special."

Not A Sleeping Car Passenger

A man in pink pyjamas and a blue dressing-gown walked up to London Bridge Station ticket office in the rush-hour. He bought a ticket for Gravesend, then made his way through the crowds to the platform and sat in the train. An embarrassed woman passenger got out and told the station inspector. Police coaxed the man to an office. He was identified as a Guy's Hospital patient recovering from a leg operation. An ambulance took him back to the hospital. —*From the "Daily Herald."*

Henpecked?

Rhodesia Railways ordered that married women on its staff should be replaced by single girls. Result: A marked drop in efficiency. Now, says a statement, the "no wives" rule is to be relaxed. "Married women are more experienced and work harder, possibly because they value their jobs more," an official commented. But the Rhodesia Railway Workers Union is to ask the management to think again, pointing out that wives in senior jobs stop promotion for younger women.—*From the "Evening News."*

Car for Sale

A second-hand 1948 Hillman motorcar was offered for sale at a recent Victorian Railways unclaimed goods and lost property auction. The car had been railed to a Melbourne hire purchase firm from a South Australian man, but on arrival, the firm refused to take delivery and pay freight charges. As the sender also refused to accept the return of the car, or pay the charges involved, the railways seized the car.

Bonfire Destroys Wagon

A children's bonfire started a fire which destroyed a railway wagon loaded with engineering equipment near St. Mary Cray Station, Southern Region.

Varied Transport Experience

No doubt Sir Ivan Stedeford was chosen chairman of the new Railway Planning Board because of his business and organising ability; but when it comes to transport, he has a remarkably wide personal experience, upwards as well as sideways. In the 1914–18 war he had the alarming job of sitting in an observation balloon. Nowadays he takes more comfortably to the air, in his firm's private airplane. He used to be in the car trade and still motors enthusiastically; and if there is a fox in sight he pursues it in the traditional way on a horse. But when he goes home at week-ends from his flat in Arlington House to Claverdon Hall, his home in Warwickshire, he usually goes by train so that he can do some work on the way. —*From the "Evening Standard."*

OVERSEAS RAILWAY AFFAIRS

(From our correspondents)

RHODESIA

Movement of Cattle

In Matabeleland where low rainfall has seriously affected much of the grazing, 77,000 head of cattle were railed in the seven weeks up to March 25. The normal monthly average loading for the whole system is some 30,000 head. Beasts consigned for sale and slaughter totalled 44,851 and animals from 26 different drought striken places as far apart as West Nicholson, Gwaai, Plumtree and Fort Victoria numbered 32,495. The movement of cattle from the drought areas is still continuing at the rate of 4,500 a week.

Purchase of Line

Rhodesia Railways has been negotiating with the Mozambique Railway authorities for the purchase of six miles of Portuguese-owned line which runs through Southern Rhodesian territory from Umtali to the international frontier near Machipanda. It is expected to cost £154,000; this includes over £94,000 for relaying and improving the track standard from 60-lb. to 80-lb. rail carried out last year.

Purchase by Rhodesia Railways was provided for in terms of Article IX of the Beira Convention signed in June, 1950. Ownership of the line had passed to the Portuguese when the 204 miles long railway connecting Umtali and the Rhodesias to the port of Beira was sold, in 1949, by the Beira Railway Limited.

The change of ownership now proposed is scheduled to take place on July 1, 1960. It is envisaged that the Umtali-Machipanda line will then be operated jointly, the through railcar service by the Mozambique State Railways while other trains will be hauled by Rhodesia Railways diesel-electric locomotives. Revenue over the six miles section will accrue to Rhodesia Railways, which will bear the cost of operating.

VICTORIA

Lease of Railway Land

Rentals obtained from leasing railway land to the public for various purposes exceeded £318,000 in the last financial year and are continuing to show an upward trend. To encourage more industrialists to use rail freight services, it had been decided to lease 43,000 sq. ft. of land at Arden Street goods yard, North Melbourne. With a siding frontage and accommodation for six wagons, the land is suitable for a factory or other industrial purposes.

Glass-Fibre Doors

Increasing use of fibre-glass is being made by the Victorian Railways. A pair of fibre-glass reinforced doors have been tested successfully over the past year in a suburban "Harris Train." The doors compared favourably with the cast aluminium type fitted to the original batch of 30 "Harris Trains," mainly because they cost less and were lighter and easier to repair. The fibre-glass reinforced doors have so impressed engineers that it has been decided to make them standard equipment for the next instalment of 30 "Harris Trains," first delivery of which is expected in about twelve months' time.

It is also reported that fibre-glass hatch covers are being used in all steel air-conditioned carriages. These covers are a protection for the air-conditioning equipment situated in the roof of the carriage. The light fibre-glass roof hatch is easy to remove and replace, and consequently involves no lifting strain on maintenance men. Use of fibre-glass ducting for heating of rail motors is also being planned.

WESTERN AUSTRALIA

Increased Parcels Traffic

The number of parcels being sent by rail services has increased greatly in the last six months. Although railway revenue from parcels traffic increased by 25 per cent in the last five years, the increase in the last six months has been more pronounced. This could be attributed to the fact that rates for parcels by rail have not been increased since 1953, and also because of an all-out effort by the railways to cater more fully for parcels traffic. Recently, station staff have been directed to ensure that the full address and where applicable a telephone number be placed on each parcel so that prompt advice could be given of its arrival. Stations are issued with special advice cards for this purpose. The introduction recently of a system of bulk acceptance of parcels for transit by rail from Perth also has proved most successful, and many firms have taken advantage of this system to accelerate their delivery of parcels to rail.

CANADA

Floodlighting in Moncton Yard

Installation is planned by the Canadian National Railways at Moncton hump yard, now under construction, of extensive floodlighting and low voltage distribution systems, for which the company has called tenders. The floodlighting will enable the yard to function fully for 24 hr. a day. It consists of 337 1,000-W. mercury vapour lamps, with an output equivalent to 13,500 100-W. bulbs, to be erected on 122 75-ft. Douglas fir poles. The poles will be embedded in the earth to a depth of 10 ft., and have from one to a cluster of seven of the recently-developed lamps at their peak. The low-voltage system involves distribution of power at 550 V. through cables fed from manholes.

Continuous Rail on C.N.R.

A 50-car train carrying 10 miles of continuous welded rail, to be used in Canadian National Railways track im-

Bridge Construction in East Africa

Centre bridge span of the Mkondoa River Bridge, part of the Kilosa-Mikumi line construction in Tanganyika, being cantilevered into position

provement programme, has been delivered to Debert, Nova Scotia. Consisting of 84 rails, each 1,170 ft. long, the shipment is the first of 57 miles of the recently developed rail that will be laid this year at various points in the Atlantic Region of the C.N.R.

The 132-lb. rail was fabricated by Dosco at its Sydney plant in conventional 39-ft. lengths, and welded into 1,170-ft. lengths at the hump yard at Moncton. Most existing rails weigh 115 lb. per yd.

Later this year continuous rail of varying lengths will be laid in the Bedford, Oxford, Pictou, Tormentine, Chipman, Grand Falls, Glendyne, and Nashwaak sub-divisions. Installation of the rail will take place near Hyde, Tatamagouche, Westville, Cape Tormentine, North Branch, Deersdale, Longley, and Plaster Rock, Riviere Bleue and Quarryville.

The track improvement programme began last year with the laying of 14 miles of the continous rail, on the main line between Painsec and Amherst, and 50 miles of the new rail in Moncton Hump Yard.

UNITED STATES

Delaware River Lift Span

The Pennsylvania Railroad crosses the Delaware River between Camden, New Jersey, and Philadelphia. The crossing is over the Delair Bridge 4,397 ft. in overall length and carrying a double line. It has three main fixed spans each of 533 ft. and one 323 ft. swing span providing a clear opening for navigation of 120 ft. This opening is quite inadequate and in consequence one of the 533 ft. fixed spans is now being replaced by a new 542 ft. lift span allowing a clear opening of 400 ft. The new span is the longest double-line lift span in the world, and is only 16 ft. shorter than the single-line one over Arthur Kill between Staten Island and New Jersey. It weighs 2,670 tons and was floated out into position during March, but remains as a fixed span until the lifting towers under construction are completed later this year.

PORTUGAL

New Tagus Ferry Steamers

To improve communication with the South-East and with the South of Spain two new vessels are being constructed, each to carry up to 1,000 passengers, for the Tagus ferry service between Lisbon and Barreiro, with two floating pontoons to be placed alongside the latter station. This service already carries some 3,000,000 passengers annually, a traffic expected to increase considerably.

SWITZERLAND

New Station at Effretikon

Until now the only station on the heavily-occupied main line between Zurich and Winterthur unprovided with subways and with adequate platform accommodation has been Effretikon, junction for the Kloten and Wetzikon lines. A beginning has now been made with a reconstruction which will provide five platforms from 785 to 985 ft. long, and which will replace four level crossings by two subways connecting all platforms. There will be seven tracks through the station, and the main-line speed restriction will be raised from 45 to 68 m.p.h. Both passenger and goods stations will be rebuilt, and electric signalling will be installed.

The Kerenzerberg Tunnel

The track has now been laid through the new and lengthy Kerenzerberg tunnel, between Weesen and Mühlehorn on the main line from Zurich to Chur. This has been bored as part of the doubling of this route, and permits abandonment of the existing single track along this part of the precipitous mountainside on the south bank of the Wallensee. The tunnel will be brought into use this month, but a single track only will be in use until the new signalling at Gäsi and Mühlehorn has been completed. The Gäsi signalling will be operated from Weesen.

FRANCE

Track Replacement at Tourcoing

At Tourcoing, the S.N.C.F. recently replaced a double crossover made up of 45 kg. per metre rail by a new crossing of 50 kg. per metre rail. After preparatory work, the final phase, consisting of the lifting out of the former crossover and the placing in position of the new, was accomplished in a single day, this being the only time when it was necessary to stop traffic. The complete crossover, which was winched into position, weighed approximately 80 *tonnes*.

Publications Received

Kemp's Engineers' Year-Book, 1960. Two volumes. London: Morgan Brothers (Publishers) Limited, 22, Essex Street, Strand, W.C.2. 7 in. x 4¾ in. x 1½ in. 1,324 pp. and 1,414 pp. Illustrated. Price 87s. 6d.—This year's edition contains 79 chapters on theory and practice in all branches of engineering including many vitally important aspects of railway design. Completely new sections include a most comprehensive survey of the overall design considerations to be taken into account when planning the use of diesel traction by railbuses, railcars, and locomotives with electric and hydraulic transmissions. Some useful statistics concerning free-piston gas-generator locomotives are incorporated in the same section. Electric traction is the subject of a separate section in which the principles of alternative systems are compared and the different methods of supply and control described. New sections also deal with electronic engineering, nuclear power, prestressed concrete, and railway brakes and signalling. Additions to previous chapters refer to high-temperature steels, coolants for cutting tools, ceramic-tipped cutting tools, skids and dolly trucks for handling machinery, base-exchange water softening, boilers and furnaces, performance of refrigerants, and slewing rings for cranes. New pages of tables and text total 120. Many of the alterations and additions take into account new and revised British Standards. The work is well indexed.

A.B.C. Coach & Bus Guide.—Published by Index Publishers Limited, of 69 Victoria Street, London, S.W.1, and Dunstable, the 1960 summer edition of the *A.B.C. Coach & Bus Guide* gives details of the new through motorcoach services on some fast schedules using the London–Birmingham M.1 motorway. There are reductions in journey time on a good many services. The layout of the tables is clear, and the standard of typography high. Much travel information is provided besides particulars of timings, and the 464-page guide is good value at 5s.

The Fowler Diesel.—Two- and three-axle shunting locomotives with mechanical and hydraulic transmissions are described in a 24-page book published by John Fowler & Co. (Leeds) Ltd. The current production programme includes 13 basic standard models from 120 to 330 b.h.p., and from 20 to 46 tons in weight, for each of which an outline drawing and general data is provided. Copies may be obtained from John Fowler & Co. (Leeds) Ltd., Leeds, 10.

The Nimonic High-Temperature Alloys, Engineering Data.—This data book published by Henry Wiggin & Co. Ltd. on the Nimonic heat-resisting alloys has been revised. It includes complete properties of alloys currently manufactured in the Nimonic series; Nimonic 75, 80A, 90, and 105, originally designed for use in the aircraft gas turbine engine but now with many applications in other industries. The publication has tables in both English and metric on mechanical and physical properties, creep characteristics, and fatigue and impact properties. A series of diagrams gives detailed data on creep properties in a form which is convenient to the designer. Copies may be obtained, free of charge, from Henry Wiggin & Co. Ltd., Thames House, Millbank, London, S.W.1.

Oil-retaining Bearings.—A 10-page catalogue of Lubrook porous-bronze and Ferrocite porous-iron bearings for signal inter-locking and point operating mechanisms, and other uses where long life is required without any lubrication maintenance. An introductory section explains the powder-metallurgy process for obtaining a strong and rigid structure with a capacity for oil retention of 23–27 per cent of the total volume and finished to close limits. Other sections give limits and tolerances, installation data, material specifications, strength and performance, and instructions for the machining of bearings which are not critically loaded. Copies may be obtained from Bound Brook Bearings Limited, Trent Valley Trading Estate, Lichfield, Staffs.

Colliery Branch Line Construction in the Eastern Region

Two-mile spur to serve new coal mine being sunk at Cotgrave

End of new viaduct before connection to embankment

THE Eastern Region of British Railways is constructing a rail connection to link the new coal mine being sunk at Cotgrave, with the Nottingham–Grantham line at a point near Radcliffe-on-Trent.

The new railway is almost two miles long, more than three-quarters of it in single line. From the colliery end, the railway runs a mile to a junction where it branches out into two single-line curves, each approximately ¼-mile long. These form an Eastern and a Western link with the main line.

The Eastern curve is carried over low-lying ground, forming the west bank of the River Trent, on a 30-ft. high viaduct which abuts onto the one carrying the Nottingham–Grantham line. The track for the Western curve will be laid on an embankment.

Section on Embankment

Four road crossings at regular intervals along the line have caused the level of the railway to be kept about 21 ft. above that of the surrounding area, except at the colliery end, where the natural slope of the ground and the absence of a road, permits a return to ground level. The ruling gradient is 1 in 392, with a maximum over 1,030 yd. of 1 in 199. Material for the embankments amounting to some 300,000 cu. yd. has been obtained from a borrow pit alongside the A.52 road.

A short spur off the new branch line could connect the site suggested as suitable for a new 2,000,000-kW. power station at Holme Pierrepont, with the southern part of the Nottinghamshire coalfield. This generating station, if authorised, would alone consume 5,000,000 tons of coal annually.

The main feature of the civil engineering work is the viaduct carrying the Eastern curve of the new line. It is more than 1,000 ft. long and has 37 spans, each of which is about 30 ft.

Flood Protection

Piles have been driven well into the gravel beds underlying the site to protect foundations against scouring from flood waters in the event of the ground being worked in the future. From the pile caps, trestles, comprising two circular concrete columns 2 ft. 7 in. in dia., carry longitudinal concrete girders, cast *in situ* and L-shaped in cross section. The columns are formed by placing reinforced concrete within pre-cast reinforced concrete pipes.

Between the main girders, a transverse deck of composite pre-stressed and *in situ* concrete construction will carry the ballasted permanent way. Walk-ways will be built along the tops of the main girders.

Four bridges have had to be constructed in connection with the new branch. The biggest is over the Nottingham to Grantham road. This is a steel structure, with a double span of 50 ft. and 48 ft. 6 in. The main girders are of built-up, welded sections and the deck consists of transverse girders encased in concrete. The parapets are of steel mesh panels. The centre support is a welded steel portal and the bearings are of rubber to allow for expansion.

At Stragglethorpe Road, the new bridge is of similar construction to the one above, but with a 42-ft. span.

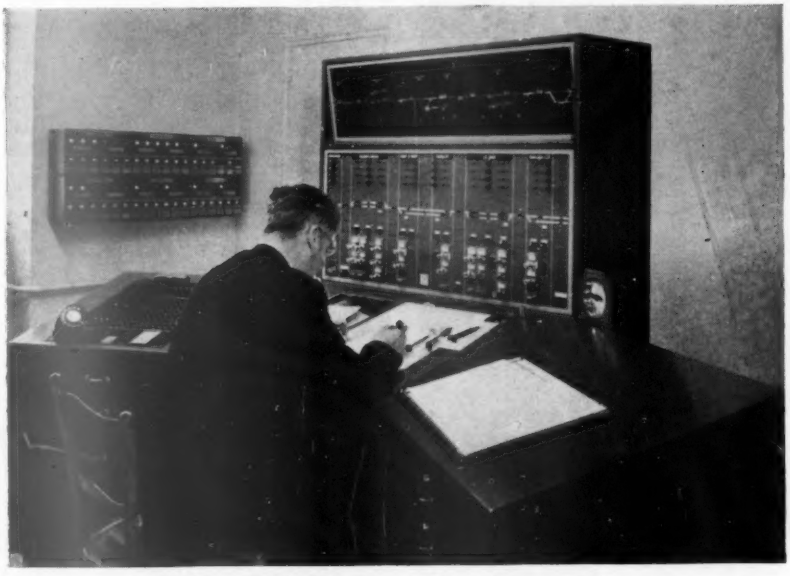
Two small bridges, one at Viaduct Lane with a 14-ft. 6-in. span, the other at Holme Lane with a 25-ft. span, are of composite pre-stressed and *in-situ* concrete construction. The whole of the work has been carried out under the direction of Mr. A. K. Terris, Chief Civil Engineer, Eastern Region, British Railways. The main contractor for the work was the Cementation Co. Ltd.

Up side face of the double-span bridge over the Nottingham to Grantham Road

WITHDRAWAL OF PASSENGER TRAIN SERVICE BETWEEN GUISBOROUGH AND LOFTUS.—British Railways, North Eastern Region, has announced that the passenger train service between Guisborough and Loftus will be withdrawn from May 2, 1960. From the same date Boosbeck Station will be converted to a public delivery siding and Brotton and Loftus Stations will deal only with goods and parcels traffic. Alternative facilities for passengers are provided by the United Automobile Services Limited and Saltburn Motor Services Limited. Parcels and small consignments of freight traffic requiring collection and delivery will continue to be dealt with by British Railways' road motor vehicles. Parcels and small consignments of freight traffic not requiring collection or delivery may still be handed in, or called for, at Loftus and Brotton Stations.

New Signalling between Dole and Vallorbe, S.N.C.F.

Electronic remote control and programme storage equipment on recently electrified route



Control console at Mouchard, showing arrow indicators

THE French National Railways, South-Eastern Region, has brought into service on its Dole-Vallorbe section an installation of remote control. The line forms part of the main international route from Paris *via* Dijon to Lausanne, and to Italy *via* the Simplon Tunnel, and carries an important traffic, very heavy at certain seasons. This is densest on the section between Arc-Senans and Mouchard, 4·35 miles long, common to the Dole-Vallorbe and Besançon-Lyons routes.

Doubling of Route

The section from Dole to Pontarlier through Frasne was opened as a single track between 1857 and 1862 and extended to Vallorbe in Switzerland, *via* Les Hôpitaux-Neufs, in 1875. (This piece of route no longer exists.) In 1900–01 the Dole-Pontarlier line was doubled and its importance became much increased in 1906 on the opening of the Simplon Tunnel. A Swiss company had completed in 1870 a line from Vallorbe to Daillens, on the Yverdon-Lausanne line, itself opened in 1855. Another line connecting Pontarlier with Neuchâtel, entering Switzerland at Les Verrières, had been finished in 1860. At the beginning of this century several proposals for improving Franco-Swiss rail links were discussed and the result was the opening in 1915 of a double line 15 miles long, from Frasne direct to Vallorbe involving five tunnels, the last being under Mont d'Or and 3 miles 1,388 yd. long. This crosses the Swiss frontier a short way from its eastern mouth. The distance from Paris to Milan by this route is 511 miles, while the Pontarlier-Les Verrières line forms the shortest connection between Paris and Berne. From Dole to Vallorbe the distance is 63 miles.

The first 20 miles as far as Mouchard offer no particular operating difficulties but in the next 28 to Frasne there are 11 tunnels and heavy gradients, up to 1 in 50 over some 18 miles, with many 18-ch. curves. The Frasne-Vallorbe section reaches an altitude of 2,853 ft. above sea level and is subject to heavy snowfalls.

Varying Systems of Electrification

Electric working was introduced in 1958, using the 25,000-V., 50-cycles system, now standard in France, affording electric traction—although not on the one system throughout—between Paris and Milan—and beyond. Between Dijon and Dole the 1,500-V. d.c. system was already in use; at the latter station one track is now fitted for connecting to either form of power, as required, the two others having neutral sections; shunting on these is effected by diesel or other form of independent locomotive.

At Pontarlier, change-over sections are provided, connected as necessary to the French power supply or the Swiss Federal Railways, 15,000-V. 16⅔-cycles traction feed, as the service thence over the Les Verrières line is operated entirely by them. Heavier loads can now be run, avoiding duplication of trains in holiday periods, and higher speeds maintained on up gradients; certain services have been accelerated in consequence.

The accompanying diagram shows the layout of the line, which has been singled, without loss of capacity, over a distance of 50 miles in all, reducing track, overhead equipment and other costs, especially in the 16 tunnels, where room for the contact wire and the train pantographs was readily obtained by placing the single line centrally.

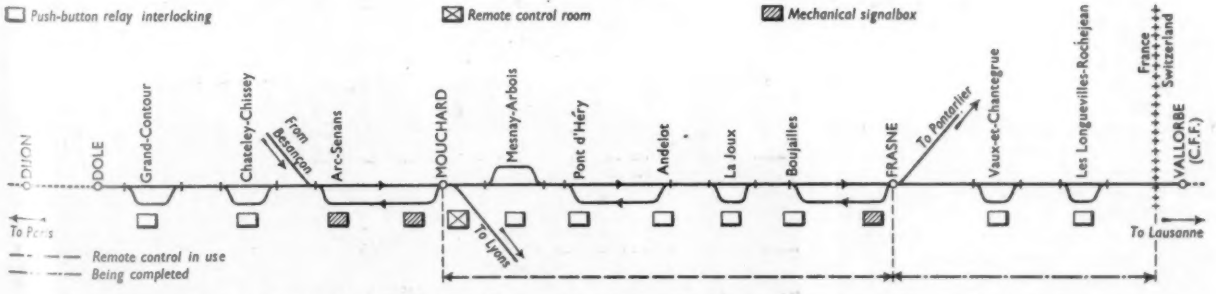
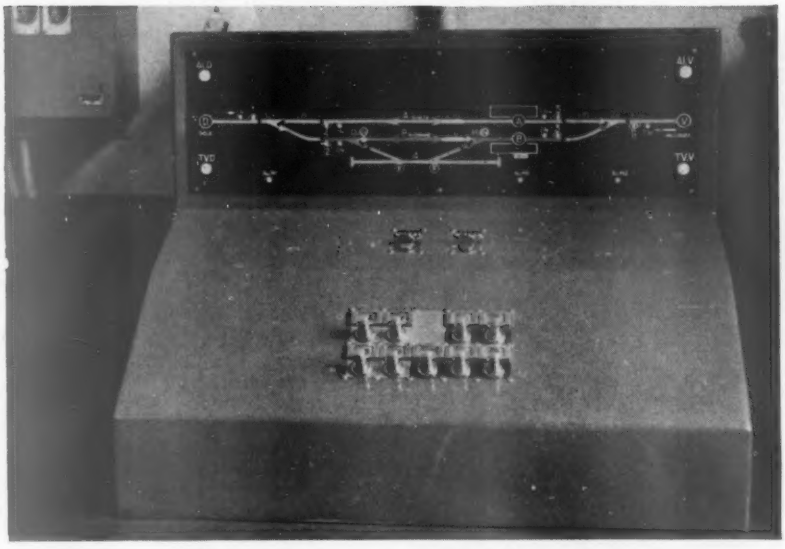


Diagram of Dole-Vallorbe line, showing relay interlocking and mechanical boxes, and remote-control rooms

Double-Track Sections

It was eventually decided, for operating reasons to maintain double track between Pont-d'Héry and Andelot and Boujailles and Frasne, where there was no tunnel, and between Arc-Senans and Mouchard, used by the Besançon-Lyons trains. These modifications made the route particularly well suited to the application of remote control of an improved type.



P.R.S. push-button panel at crossing station

Track circuiting, using a.c. circuits working at frequencies of 300, 850, 1,500 and 2,000 cycles, and electronic equipment working on the system described in our issue of March 11, 1955, is provided throughout, controlling colour-light signals and working with the interlocking apparatus at the stations on well-known principles. The signalling sections vary from about 1,640 to 2,730 yd. on double line and about 2,190 to 2,625 yd. on single. All signals at, or at the approach to, stations or junctions are "absolute," and may be passed when at danger only by permission, under strict rules.

Aerial Line Circuit

A two-way aerial line circuit has been provided throughout, to give eventually constant communication between train crews and the traffic controller. In the case of the 300 and 850-cycle track circuits, the feed itself is coded at 15 and 21 cycles to protect against harmonics in the traction circuit. The 1,500 and 2,000-cycle track circuits, always short, have steady feeds. Directional controls are provided between the station starting signals leading to single-line sections.

In its normal unoccupied condition such a section between stations can be taken possession of for a movement from either end, which simultaneously excludes any possibility of an opposing movement being signalled over it, while in turn the section must, of course, become once again clear before another operation of the kind can be effected, although following movements may take place under the protection of the automatic intermediate signals.

Loops at Crossing Stations

Ordinary single-line stations have one direct line, over which all through and many other movements normally take place, and a loop for crossing or overtaking purposes..

The maximum speed over the diverging route is limited to 37 m.p.h. Facing points in the main track are electrically operated, but siding connections have hand levers under electrically released key controls. Similar arrangements obtain at the locations where single and double line sections join except where, as shown on the diagram, mechanical equipment remains.

Locking of Facing Points

These facing points include an improved form of trailable locking mechanism and semi-independent tongues connected to slotted link stretcher rods, reducing by about one-third the effort required to reverse them; this trailable feature reduces the movements needed when shunting is being effected as the station official need not concern himself with the position of any points taken trailing. The points at Arc-Senans, where the single line from Chatelay-Chissey joins the double line thence to Mouchard, are of special large radius type, with tongues 52 ft. 6 in. long, allowing a speed of 75 m.p.h. in both directions.

Relay Interlocking

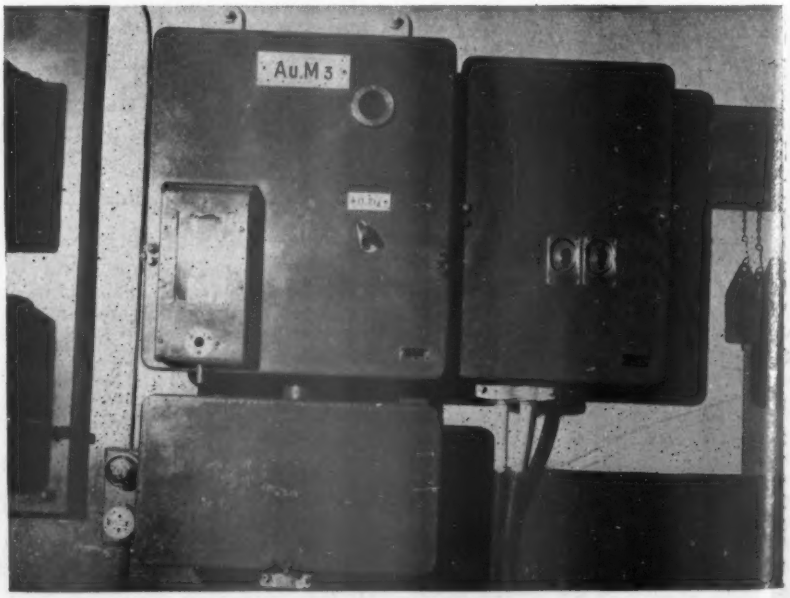
Nine local relay interlocking installations of the standard push-button type known as the P.R.S. (*poste tout relais à transit souple*) have been provided and were brought into service before the remote control was superimposed, being worked for the time being continuously by the station staffs. This applies still at the two stations between Dole and Arc-Senans and the two between Frasne and Vallorbe. The former two will not become remotely controlled until a much later date, when the whole line from Dole is brought under the direct control of centralised equipment at Dijon, where the traffic regulator already is reponsible for taking the final decisions respecting traffic movements throughout its length. Their P.R.S. apparatus was illustrated in our issue of February 13, 1959, and is being used in almost all new power interlocking work by the S.N.C.F.

The customary track, point, route and approach locking circuits are used with "pre-selection" facilities. The push-buttons are located on a desk, away from the illuminated diagram, and can exercise separate functions by push or pull action. The relays are mounted in groups on steel framings and pre-wired complete before being sent to the site. All items have plug connectors.

The various locations are covered by a continuous cable, with junction boxes as required, containing a central quad and nine grouped round it, with polythene insulation.

Cable Insulation

In the cable the central quad is screened by an aluminium sheath; the outer ones are armoured and have a PVC sheath and are allocated to the signalling, directional locking, and short-



"Shunting permitted" release apparatus

distance telephone circuits. The central quad serves to transmit the remote controls and return indications, with phantom circuit carrying the 420-V. 50-cycle supply to the signalling locations, obtained normally at the stations from the public mains, with emergency connection to the traction circuit or to diesel-generator sets with automatic starting.

Remote Control

The remote control is exercised from a panel at Mouchard, and at present is operating as far as Frasne using electronic equipment supplied by Télécommunications Radioélectriques et Téléphoniques S. A. The section between Frasne and Vallorbe—singled as long ago as 1943—is to be brought into use shortly, working on another electronic system derived from an earlier arrangement using d.c. circuits applied to the control of satellite locations dependent on a central signalbox in large interlocking installations. This apparatus has been provided by the Compagnie de Signaux et d'Entreprises Électriques. Both systems work by impulses at audio-frequencies but the method of utilising them varies. In addition the control over the Mouchard–Frasne section is combined with a *programmateur*, or programme storage apparatus by which the controls for a certain number of movements can be set up in readiness and become operative later, when the train movements require.

This is quite different from the "programme machine" used by London Transport Executive which has a punched travelling band representing the working timetable for an entire 24-hr. period. The French apparatus allows the traffic controller to store up to four sets of controls at any station in readiness for the train movements he contemplates effecting, but leaves him free to alter them should some special circumstance necessitate it.

Four Ranges of Arrow Indicators

Between the control buttons on the panel and the illuminated track diagram are four ranges of arrow indicators which can become variously illuminated to show what controls have been stored, and when a set of these becomes utilised the remaining indications move automatically down one stage to represent the new condition of affairs. The lowest, or normal, range represents the situation immediately applicable.

A feature of this arrangement, distinguishing it from "pre-selection" as hitherto used, is that the next stored set of controls does not become effective on site directly a train clears a route, or specific fouling point, but remains stored until the following one approaches within a certain distance. It is open also to the controller, should he see fit, to delay this action himself for whatever period he requires.

The step-by-step movement of the indications is moreover subject to the conditions obtaining at adjacent stations, so as to maintain in the same horizontal line the illuminated signs applying to a particular train and thus facilitate their ready reading. The time taken to transmit a control is 0·4 sec. in both systems; as regards the return indications 40 can be sent in 2 sec. by the "T.R.T." system, while with the "C.S.E.E." arrangement being completed between Frasne and Vallorbe without programme storage facilities, a group of two indications can be transmitted in 0·5 sec.

We are indebted to Monsieur J. G. Walter, Chief of the Department responsible for the work in the Direction des Installations Fixes, for the above particulars.

Carriage Washing in the Eastern Region

Intermediate type of washing machine for small cleaning depots

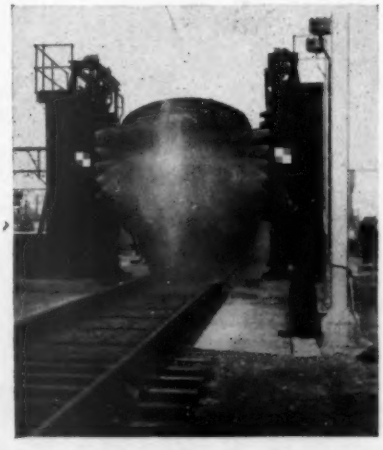
AFTER trials and research with the standard type of carriage washing machine, modifications carried out by the Eastern Region of British Railways have enabled the daily water washing of carriages to be carried out satisfactorily with a machine of reduced size. This intermediate type of carriage washing machine consists of two pairs of vertical felt-carrying spindles instead of the normal four pairs. With a reduction in the amount of water used, initial costs are substantially reduced because it is unnecessary to recover and filter the water for re-use as is the usual practice with the standard machines.

It is proposed to install a number of machines of the intermediate type at the smaller cleaning depots in the Eastern Region. The first of these is now in use at Southend Victoria, supplementing the mechanical cleaning facilities of the main servicing depot at Ilford. The electric trains now have a major clean at Ilford every fourth day, and a water wash at Southend Victoria on the other three days.

The intermediate type of carriage washing machine consists of two pairs of vertical flail shafts supported in a free-standing structure on either side of the track. It has an access ladder and platform for maintenance purposes. Each of the four shafts is driven individually by a geared motor-drive unit and carries about 300 strips of felt, 26 in. long by 4 in. wide, mounted on rubber fins attached to aluminium carrying bars. These bars are of an improved pattern and are removable to facilitate the replacement of worn felts and other servicing requirements. The bars can also be adjusted to obtain the maximum degree of wear from the felt strips before replacement becomes necessary.

Washing Action

Water is received from an underground concrete storage tank and pumped to the spray nozzles on the washing machine. The water is sprayed on to the coaches while passing between the flail shafts where the revolving felts create a wiping action to remove the dirt. As they leave the machine, a clean water spray then rinses the coaches.



Electric train passing through machine. Note photo-electric equipment at top of columns

The plant is fully automatic and can be operated to clean stock moving through the machine in both directions, but provision has been made for manual control by a selector switch on a push-button desk which contains a stop for each component of the machine. A "no wash" button is also fitted to allow for marshalling movements within the carriage cleaning sidings. Automatic control is achieved by two photo-electric cells and associated projector lamps situated between 40 and 50 ft. in advance of the machine. To avoid interrupting the automatic operation, the light beams from the projector lamps to the photo-electric cells are at an angle of 45 deg. to overcome the gap between coaches.

The equipment was manufactured in the Locomotive Works, Darlington, North Eastern Region, and installed under the direction of Mr. P. Gray, Works Manager, Stratford, Eastern Region.

The principal sub-contractors are as follow:—

Flail shaft geared drives	Moss Gear Co. Ltd.
Electric motors	General Electric Co. Ltd.
Flail shaft bearings	S.K.F. Co. Ltd.
Aluminium tee bars	British Aluminium Co. Ltd
Rubber straps	George Angus & Co. Ltd.
Open steel flooring	Lionweld Limited
Centrifugal pump	Pulsometer Engineering Co. Ltd.
Spray nozzles	Leadward & Becketts Limited
Pipe fittings and valves	Crane Limited
Automatic control equipment	Allen West Limited
Photo-cell equipment	British Thomson Houston Co. Ltd.

New Kingsferry Lifting Bridge

Vertical lifting bridge giving improved rail and road connection between the Isle of Sheppey and the mainland

Lifting span of new bridge in raised position, showing new rail approach and train crossing old bridge

THE new Kingsferry lifting bridge, which, as recorded elsewhere in this issue, was officially opened by the Duchess of Kent on April 20, provides for the first time an adequate road and rail link between the mainland of Kent and the Isle of Sheppey.

The design of the bridge is of the vertical lifting span type and provides a clear fairway for shipping of 95 ft. width.

The lifting span is raised on four reinforced concrete piers which are some 130 ft. high. This gives clearance for shipping of 95 ft. between high water and the underneath side of the roadway when raised. The 650-ft. long bridge is carried on two main piers flanked by approach piers on each side with shore abutments. It has an overall width of more than 50 ft. which includes a single rail track, a 24-ft. wide roadway and a 6-ft. pathway.

Lifting Machinery

The reinforced concrete towers house the counterweights, sheaves, and bridge control room. The two machine rooms, one each side of the river, are housed below road level. The lifting span, which rises vertically between the towers, weighs 465 tons and is counterweighted by four 110-ton weights. The bridge is raised by electric motors which are specified to raise it to its full height in 1½ min. In the event of a breakdown in the electricity supply, standby diesel alternators are capable of raising the bridge to its full height in about 15 min. There is a synchronous tie between the motors in each machine room to ensure that the span remains level during raising and lowering. The machinery chambers at each main pier rest upon two concrete cylinders which are founded in the London clay approximately 60 ft. below high water level. These cylinders are hollow, of 32 ft. external diameter with reinforced concrete walls 5 ft. 6 in. thick.

Tunnel for Cabling

Cables and gas and water services are taken down the hollow cylinders and through a tunnel driven below the river bed between the piers. The tunnel is 8 ft. 6 in. internal diameter and 127 ft. long measured between the centres of the piers, and about 15 ft. below the level of the river bed. The shafts and tunnel are equipped with electric lighting and access is by staircase from bridge level.

On each side of the lifting span there are three side spans of approximately 80 ft. each. The approach piers are each founded on five reinforced concrete piles 4 ft. in diameter founded on London clay about 80 ft. below high water level. The road and rail approach embankments and main abutments are founded on difficult ground. The whole area is marshland and the first 25 ft. depth below the surface is very soft clay overlying stiff London clay. The top clay is so soft that the maximum height of embankment which could be built without special measures was approximately 14 ft. above the existing ground level. Special measures were taken to accelerate the settlement in the embankments adjacent to the solid bridge structure. Because of the ground conditions the main abutments of the bridge are hollow boxes resting throughout on concrete piles approximately 18 in. in diameter and between 50 ft. and 60 ft. in length.

Rail Connection

British Railways, Southern Region, track which was electrified last year has been realigned to cross the bridge, but there is no third rail laid on the lifting span. Trains are of sufficient length to span the lifting section, and so maintain third rail continuity.

The total cost of the scheme amounted to £1,380,810, of which £122,500 was subscribed by the British Transport Commission. The main contractor for the bridge was John Howard & Co. Ltd. and the sub-contractors were Dorman Long (Bridge & Engineering) Limited and Sir William Arrol & Co. Ltd. Messrs. Mott, Hay & Anderson were the consulting engineers.

Permanent way connection to lifting span, showing switchgear for electrical connection of running rails

British Railways 25-kV. a.c. Electric Locomotive

General Electric Co. Ltd. 3,300-h.p. Bo-Bo passenger locomotive for the London Midland Region

British Railways type "A" 3,300-h.p. 25-kV. 50-cycle a.c. electric locomotive hauling passenger stock during driver training on the Styal Line, London Midland Region

THE first of 10 25-kV. electric locomotives ordered from the General Electric Co. Ltd. is now in service on driver training in the London Midland Region of British Railways. The locomotives are designed for a wide range of passenger and goods duties, including the haulage of 100 m.p.h. express passenger trains, and carry British Railways type "A" designation, the serial numbers being E3036—E3045, inclusive. Provision has been made for operation on both 25-kV. and 6.25-kV. 50-cycle a.c. supply.

The mechanical parts for these locomotives have been designed and built by North British Locomotive Co. Ltd. as sub-contractors, and the specification requirement of a maximum axle load of 20 tons, using the Bo-Bo wheel arrangement, has been met with a comfortable margin, the overall weight of the first locomotive being below 77 tons. This has been achieved, using traditional materials, by very close attention to the structural and detail design for minimum weight of all major and minor components.

A valuable feature of the locomotives is that they have been designed to give the advantages of a duplex equipment. With the exception of the main transformer and its associated equipment the locomotive can be divided into two virtually identical halves. In emergency, in addition to the ability to isolate single traction motors, a complete bogie can be cut out with its auxiliary equipment, rectifiers, and so on.

The principal characteristics are as follow :—

Wheel arrangement	...	Bo-Bo
Maximum speed	...	100 m.p.h.
Continuous h.p. rating	...	3,300
Maximum tractive effort	...	50,000 lb.
T.E. at continuous rating	...	21,000 lb. at 54 m.p.h.
Weight in working order	...	76¼ tons
Length over buffers	...	53 ft. 6½ in.
Height over cab	...	12 ft. 4⅞ in.
Maximum width	...	8 ft. 8¼ in.
Bogie wheelbase	...	10 ft.
Bogie pivot centres	...	29 ft. 6 in.
Wheel diameter	...	4 ft.
Radius of minimum curve	...	4 ch.

Arrangement of Equipment

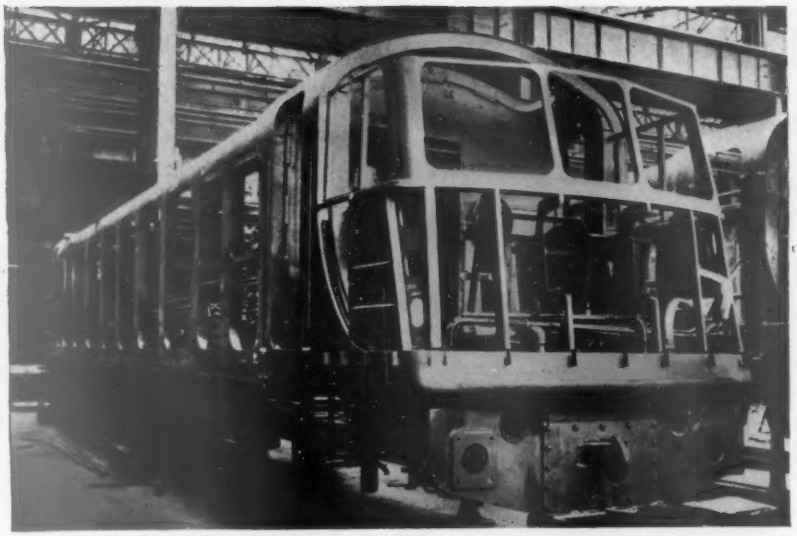
The high-tension equipment is contained in a steel enclosure, one side of which forms the inner wall of the corridor connection between the two cabs. The supply change over switch and the motor driven tap changer are mounted on top of the main transformer which is centrally located and effectively divides the h.t. compartment into two sections. Each of these sections contains one of the h.t. apparatus frames and one bank of rectifiers with secondary h.t. gear, symmetrically arranged about the transformer. Access is obtained through doors from the corridor.

A machinery compartment is located at each end of the locomotive between the cab vestibule and the h.t. compartment in which are mounted the vertical motor-generator blower sets and other auxiliary equipment. At one end are mounted the two exhauster sets, a rack for the brake equipment control valves and a chemical toilet; the main air compressor is mounted at the other end, together with an auxiliary compressor which is normally used when preparing a locomotive for service, and runs off the battery to provide sufficient air pressure to raise the pantograph and close the air-blast circuit breaker.

The access doors to the h.t. compartment are fully interlocked with the pantograph raising and roof earthing gear in such a way that they cannot be opened without first dropping the pantograph and earthing the air-blast circuit breaker. The pantograph cannot be raised to the operating position until the doors are closed and locked.

Batteries, weak field resistances and air reservoirs are carried under the main frame between the bogies. The principal runs of cable are carried in a duct below the corridor floor.

Current is collected from the overhead



Underframe and bodyframe, showing thin-plate double-skin construction

line by one of the two Stone-Faiveley pantographs, feeding through a Brown-Boveri air-blast circuit breaker to the supply change over switch. This is an off-load switch operating under the control of automatic voltage detection and selection equipment to give the correct transformer tapping for running on a line voltage of 25 kV. or 6.25 kV.

The transformer output is taken from two secondary windings, each of which supplies eight Com-Pak mercury-arc rectifiers. These are arranged so that each pair of traction motors is fed in bridge by four rectifiers from each secondary. The connections are such that while under normal conditions the motors operate in series pairs, they would be effectively in parallel under wheel slip conditions. Return current to the track is taken through earth brushes running on the outer ends of the road wheel axles.

Rectifiers and Transformers

Liquid cooling is used for the excitron type rectifiers to meet the traction duty requirements of minimum size and stability in operation. Separate cooling circuits for the anodes and cathodes, under thermostatic control, ensure that the optimum anode and cathode temperatures are maintained within close limits. Extended tests in railway vehicles under varying service conditions have demonstrated its suitability in this direction.

The main transformer is of the oil-cooled type in which the oil is rapidly circulated through a radiator by a motor driven pump.

Each motor-generator blower set supplies air for two traction motors and one half of the electric equipment. The axial type blower is mounted vertically below the m.g. drawing air through the rectifier radiator mounted behind louvres in the body side. From the blower the air is passed downward into a duct from which feeds are taken to the traction motors and the air-cooled main motor chokes and the transformer oil radiator. Air flows upwards through the motor chokes and through one half of the horizontally mounted oil radiator, being discharged to atmosphere through a hooded cowl on the roof.

Pumps for the rectifier coolant and transformer oil circulation are driven by capacitor start-and-run induction motors supplied from an auxiliary winding on the main transformer.

Control Scheme

The transformer has a separate tapped regulating winding under the control of the h.t. tap changer, arranged to give a total of 38 steps of voltage regulation.

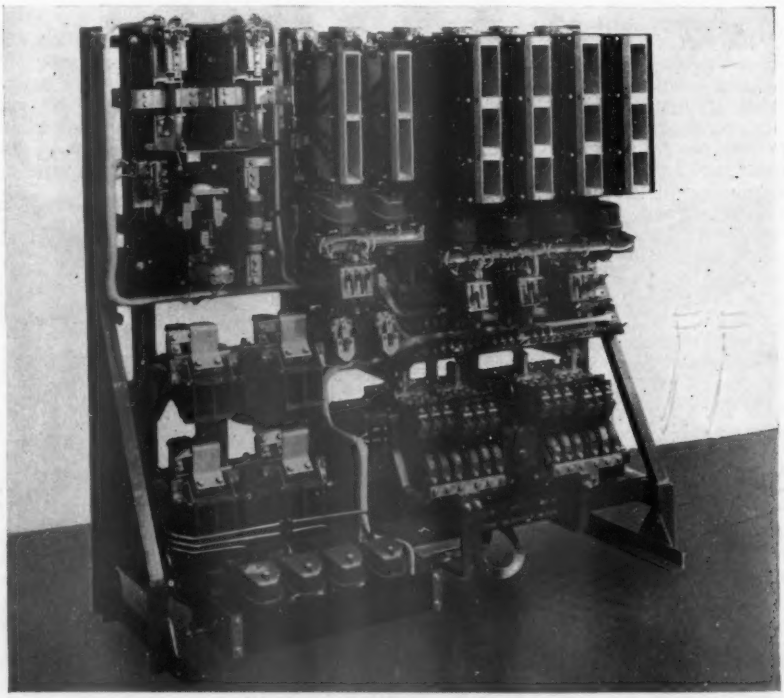
Specially developed for traction applications, the tap changer combines positive step location with the ability to run through rapidly either up or down, thus facilitating quick switching operations. It comprises a series of cam-operated non-current-breaking tap selectors immersed in oil, and four cam-operated air-break divertors on which all current making and breaking is carried out. Of the 38 steps provided, 19 are transformer taps and the other 19 are obtained by inserting resistance in circuit.

The master controller is arranged to give either individual notch control or automatic run-up or run-down. There is a total of 40 notches, comprising the 38 voltage steps mentioned, followed by two steps of motor field weakening on full voltage. An over-current relay is arranged to lift at a pre-determined current to arrest further notching so as to reduce the likelihood of tripping the overloads under run-up conditions.

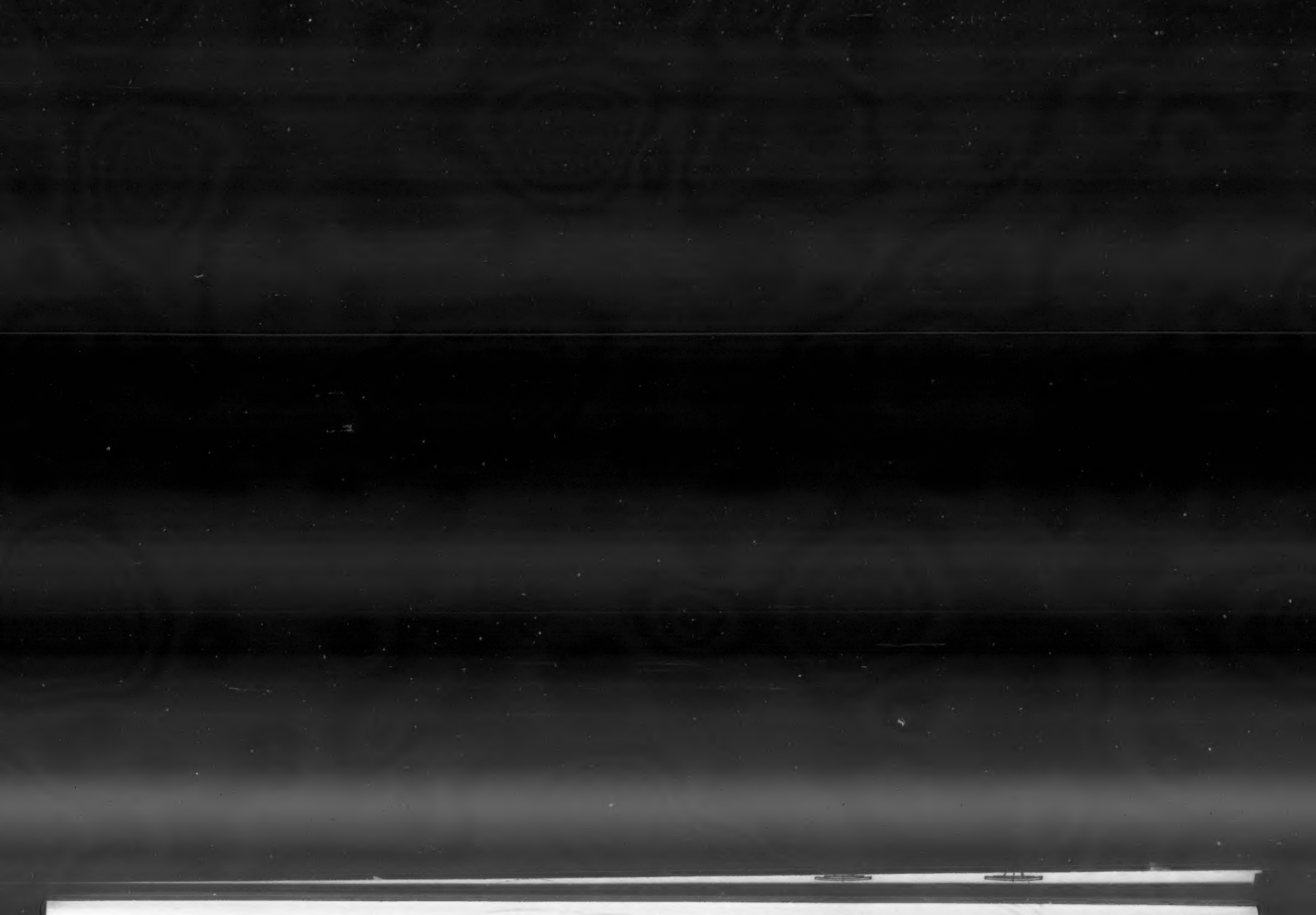
Each traction motor is fed through an overload controlled e.p. contactor and a second contactor which together are used for motor isolation. Two steps of field weakening are provided by divert resistances and a permanent smoothing divert resistance is connected across each field. Reversal is effected by two electro-pneumatically operated two-motor reversers.

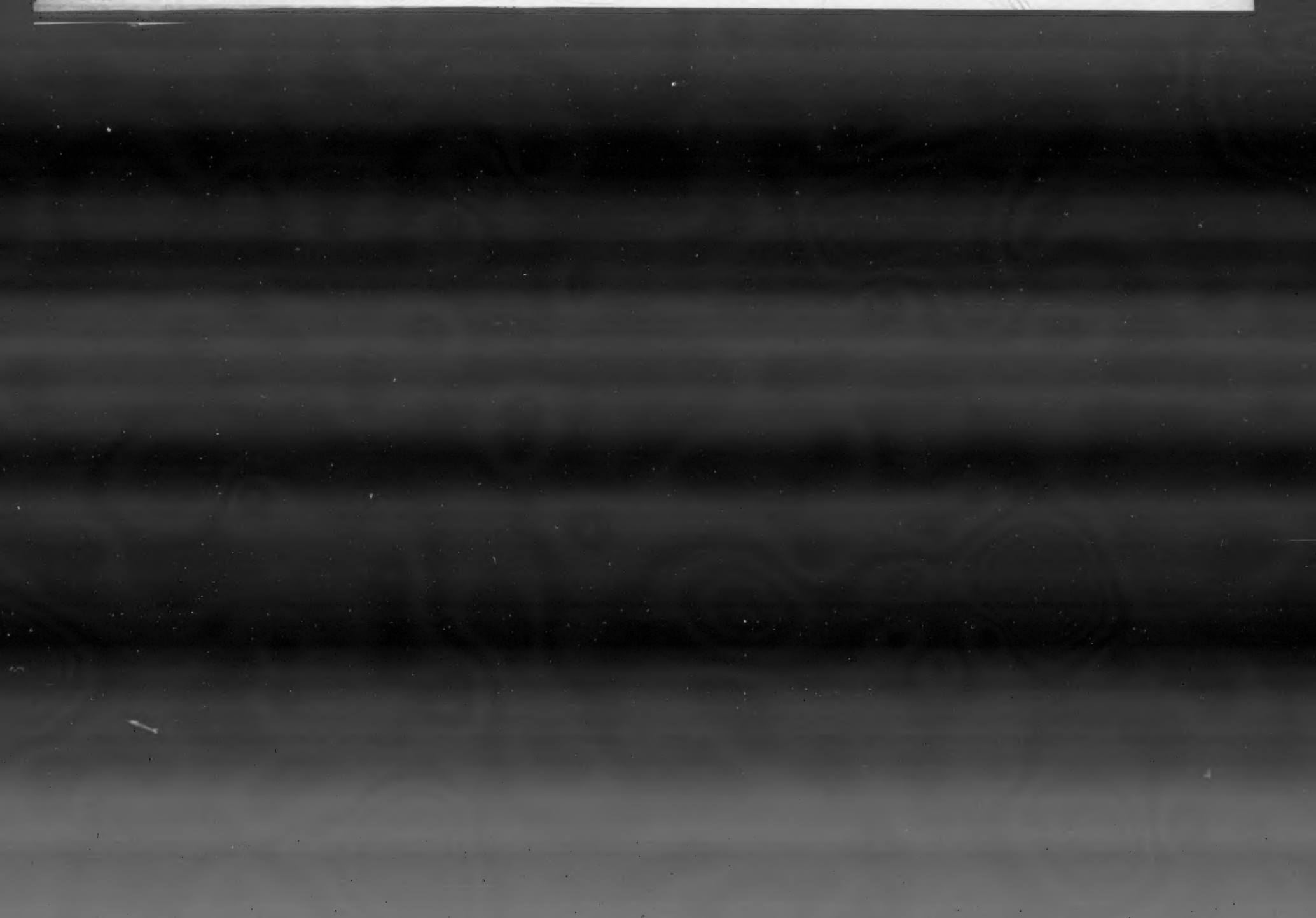
Each of the two vertically mounted motor generator blower sets incorporates a single phase a.c. driving motor, a d.c. generator and an axial flow blower. Power for the driving motors is taken from the main transformer auxiliary winding, and for starting purposes the sets are run up to speed by motoring the generator from the battery, automatic changeover to the a.c. supply being provided.

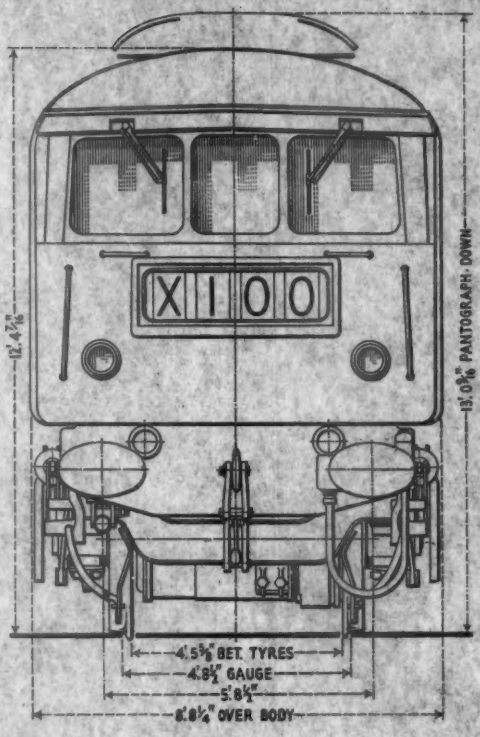
The d.c. output of one set is voltage regulated and this set is used to charge the battery, and to operate one exhauster

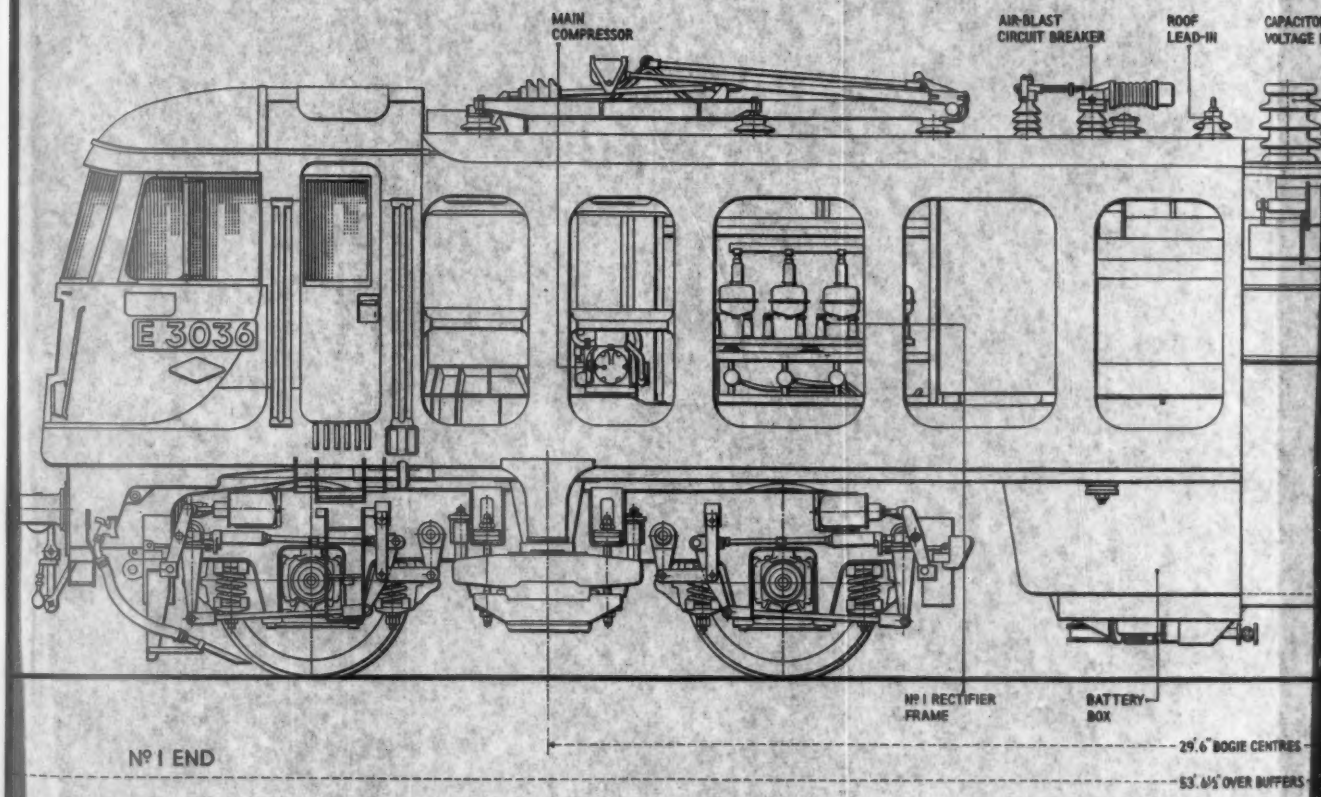


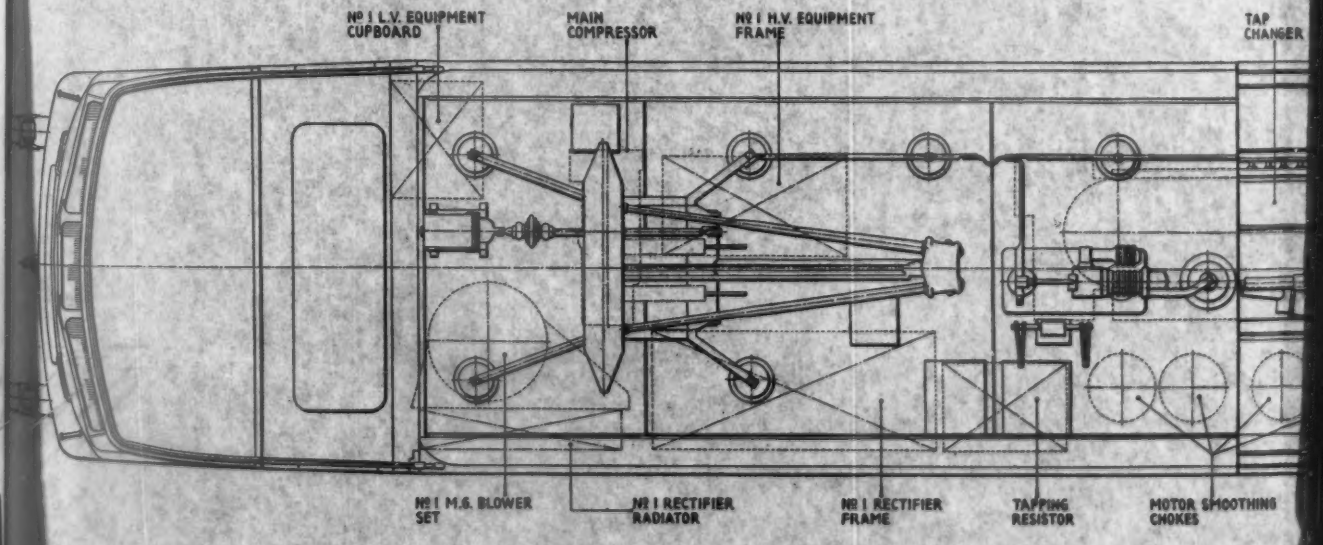
High-tension equipment frame



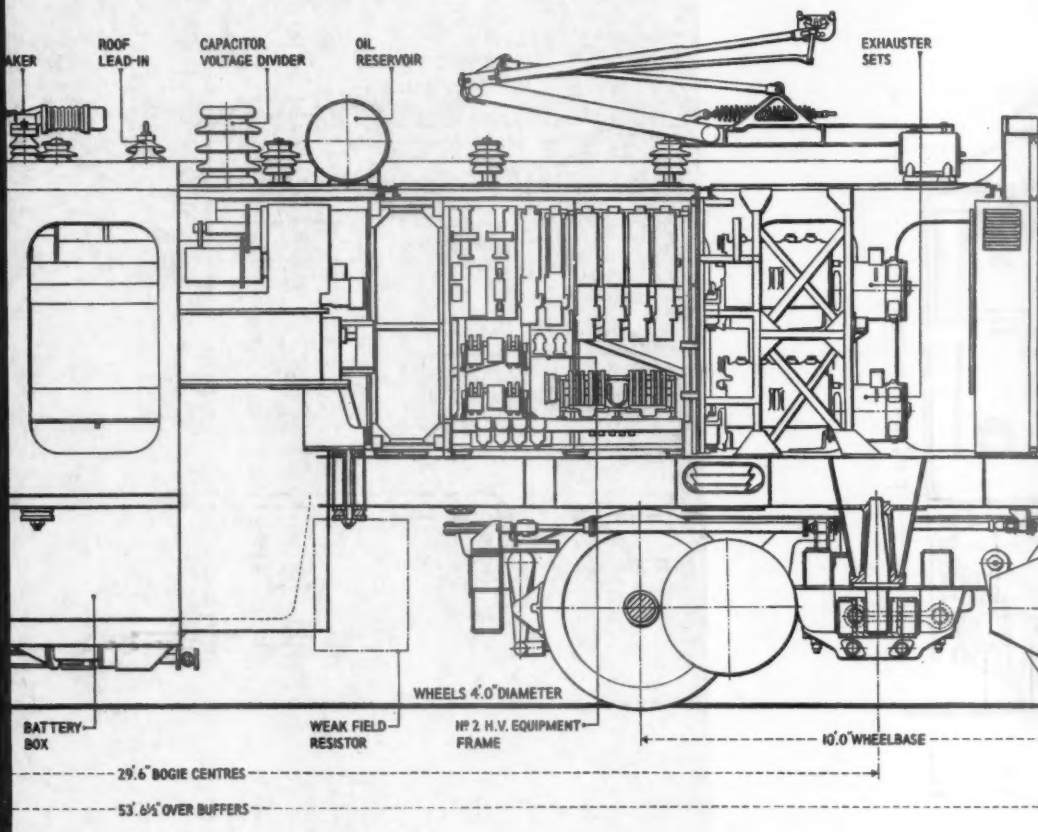


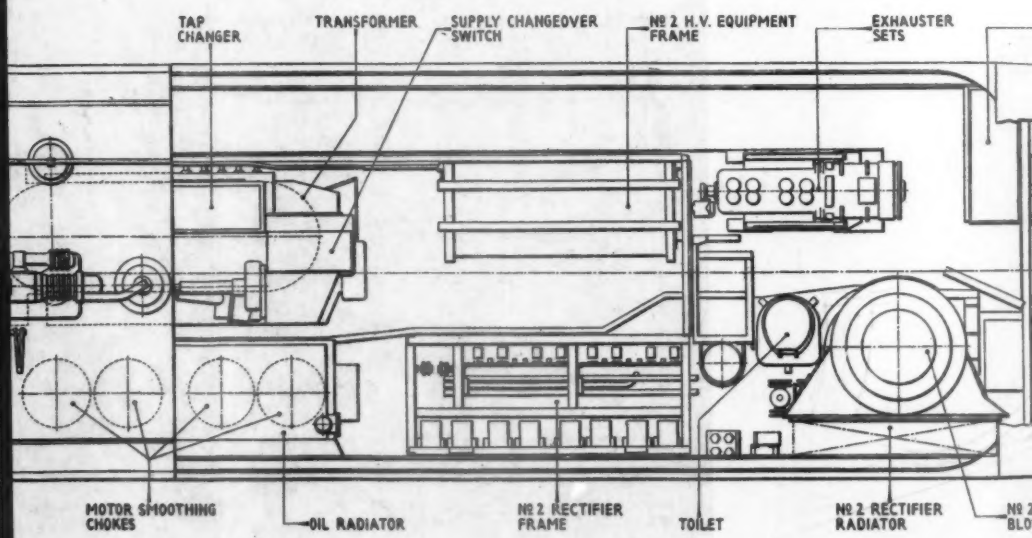

X100
12'4½"
13'0⅝" PANTOGRAPH DOWN
4'5⅝" BET. TYRES
4'8½" GAUGE
5'8½"
8'8¼" OVER BODY



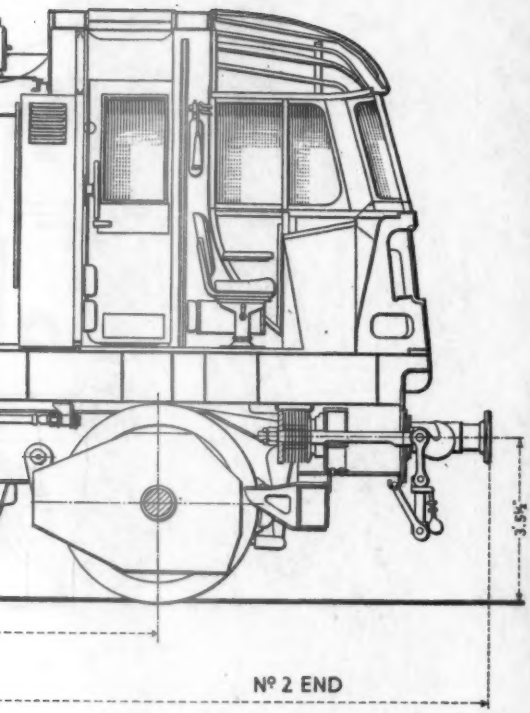


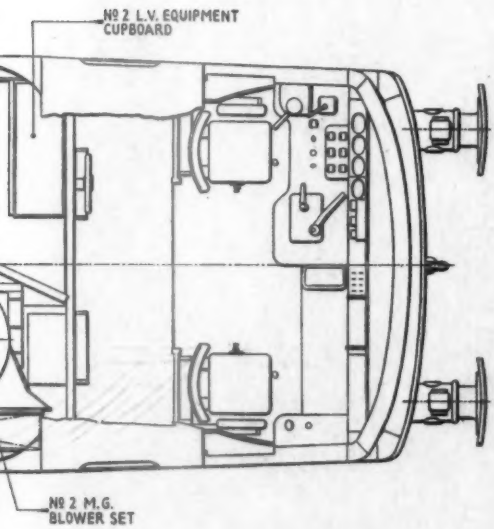
BRITISH RAILWAYS TYPE





LWAYS TYPE "A" Bo-Bo 3,300-H.P. 25-kV. 50-CYCLE A.C. ELEC





ELECTRIC LOCOMOTIVE

set and the auxiliary compressors. The other m.g. set is not voltage regulated and operates the main compressor and the second exhauster set. Provision is made in emergency for isolating either m.g. set, all essential duties being then taken over by the other set.

Traction Motors and Drives

The four traction motors are six-pole series-wound force-ventilated machines fitted with compensating windings. Class "H" insulation is used throughout and the ratings are as follow:—

Continuous rating	750 h.p.	725A.	850V.	1,165 r.p.m.
One-hr. rating	890 h.p.	875A.	850V	1,100 r.p.m.

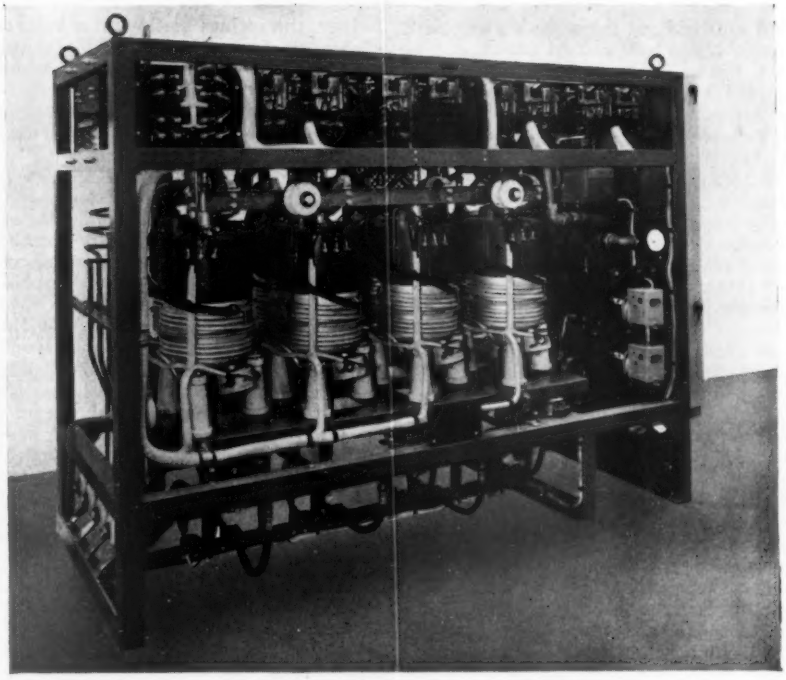
The motors, which are mounted through rubber pads on the bogie frame, have fabricated frames to which are bolted the hubs of the Brown-Boveri spring drives, which accommodate the relative movement between motor and axle. The motors are supported in the bogie frame on three point mountings, two being brackets on the motor frame and the other an arm extending from the hub of the Brown-Boveri drive.

The drive comprises a 5 deg. single helical reduction gear with a ratio of 25/74, the large wheel of which is mounted on a quill shaft carried in roller bearings in the drive hub. In the face of the gear is a ring of spring loaded pads, which engage with face dogs integral with a spider pressed on the road wheel hub. The drive is thus torsionally flexible and the axle is free to move vertically inside the quill shaft. An oil-bath lubrication system is installed.

Layout of Cab

The driver's cab at each end of the locomotive follows closely the size and layout established by the B.T.C. and approved by the Railway Unions, with minor adjustments dictated by the constructional methods adopted. Fully adjustable seats are fitted for driver and assistant driver at the full width desk, and draught screens behind each seat extend the full height of the cab.

The roof is double-skinned, packed with insulation, and the steel framing of the cab front, and the robust construction of the desk are designed to give a measure of collision protection to the crew. Electric heaters are fitted alongside and behind each seat and in the vestibule, and the driver's and assistant driver's windows are glazed with Therglass screens for electric de-misting. These screens are of laminated glass with a fine wire matrix, invisible to the naked eye, incorporated in the laminations.



Frame of Com-Pak rectifiers, showing piping for liquid cooling

Fully-suspended traction motor with Brown-Boveri spring drive incorporated in the reduction gear

Main Frame and Superstructure

The main frame base and body framing are formed entirely of thin steel plate as an integral structure. This design, which is the result of considerable stress analysis and investigation, eliminates all unnecessary material and weight, and provides a carefully proportioned and distributed stress throughout the complete structure.

The base is a full width shallow box section and is curved round and upwards to form the bases for a series of vertical pillars. Corresponding sections of the cant rail are curved downwards to form the top junctions of the pillars. Large radii are used to avoid stress concentration, and in effect each of the body sides forms a Vierendeel truss. In the central portion of the width the top deck is raised and the bottom plate lowered to increase the depth of the box section.

At the pillar locations, box-form webs extend between the top and bottom decks of the main-frame base, and the two decks are also tied and reinforced by a number of longitudinal webs. The vertical members at the location of each cab rear bulkhead and at the front door pillars, are curved over to form the roof arches. These are tied together and deep side gussets transfer a proportion of the buffing loads evenly through the structure to the body side frames. The drag boxes are fitted with B.R. standard hooks and screw gear and are arranged for the later installation of central automatic couplings, and are fitted with oval headed hydraulic buffers. The complete frame was designed to withstand a standing and buffing load of

200 tons without overstressing any part. Strain gauge tests carried out on one of the frames have successfully demonstrated its ability to meet these requirements.

Between the cabs the roof is removable in five sections to allow for the lifting out of main equipment for overhaul purposes, the roof skin of aluminium alloy being attached to a light steel framework. Four half-drop windows are fitted on the corridor side of the body with two fixed windows on the other side for illumination of the h.t. compartment. The outer skin of cold rolled full finish steel sheet is welded to the bodyside frame members.

Bogie Construction

The four-wheel bogies are of the swing bolster type, with welded box-frame construction, fabricated in $\frac{3}{8}$ in. steel plate. The weight of the superstructure is transferred to the bogies through four pillars which extend from the locomotive main frame to the bogie bolsters. These pillars, two at each bogie, are located centrally between the wheels in the longitudinal plane, and outside the centre lines of the journals in the transverse plane. The pillars terminate in spherical pads sitting in spherical seatings, to which manganese plates are welded. The plates in turn slide on manganese pads bearing on the bolsters. The complete assembly is inserted in a sealed oil bath.

Traction, braking, and transverse forces are transmitted by steel king pins attached to cast-steel centres which in turn are welded to the main frame. Each pin sits in a rubber bonded steel bush fitted to the bogie bolster. The thrust point is arranged below the axle level to minimise weight transfer. Traction and braking forces are transmitted from the bogie to the bolster by rubber bushed traction links.

The vertical load on the bolster is transferred to the bogie through two double-coil springs at each end of the bolster, the springs seating on a bracket suspended from the bogie by spring links fitted with rubber bonded hemispherical pads. In addition to the cushioning of vibration these also assist in centralising the bogie after negotiating a curve.

Movement of the bolster springs is controlled by hydraulic dampers anchored to the spring link brackets and the top of the bolster. Lateral sway is checked by swing links and rubber dampers. The bogie frame is supported on double-row roller bearing axleboxes by two nests of coil springs at each end. The springs are rubber cushioned at each end and attached by links to a compensating beam resting on the axlebox. Manganese steel faced guide liners are bolted to the frame to facilitate replacement, and rolled steel wheels and tyres are fitted.

Brake Equipment

The brake equipment provides air braking on the locomotive and vacuum braking on the train. When hauling vacuum braked stock the locomotive air brakes are controlled by the driver's vacuum brake valve. The equipment is suitably arranged for the hauling of fully braked, partially braked, and unfitted stock. Eight-in. dia. brake cylinders, one for each wheel, are externally mounted above the axleboxes, operating through clasp brake rigging. Automatic slack adjusters are incorporated.

Air is supplied to three main reservoirs with a total capacity of 9 cu. ft. by a Metcalfe-Oerlikon type "2A.115" compressor with a General Electric motor, while vacuum for the train braking is provided by two Westinghouse type "4V 110L" exhausters, also with G.E.C flange mounted motors. These run at slow speed for maintaining vacuum and are speeded up for brake release. Provision is made for the running of one exhauster off the battery for limited periods while traversing dead-sections in the overhead line.

The hand brake in each cab operates through the power brake rigging on one pair of wheels on the adjacent bogie. The auxiliary compressor is a Reavell type "TBC5" machine with integral G.E.C. motor.

Anti-slip braking is fitted under the control of push buttons on the drivers' desks, to give a limited brake application so as to reduce the tendency to slip under poor adhesion conditions. Sanding is provided for the leading wheels of the front bogie in each direction of travel, the sand boxes being incorporated in the cab structure, with filling doors in the cab sides. It is hoped that the use of sand will be unnecessary because of the electrical characteristics of the scheme which limit the tendency to uncontrolled wheelspin, and the provision of anti-slip brakes.

The locomotives have been designed to the requirements of the British Transport Commission under the general direction of Mr. S. B. Warder and Mr. J. F. Harrison, Chief Electrical Engineer and Chief Mechanical Engineer respectively of British Railways Central Staff.

Principal sub-contractors include the following :—

Mechanical equipment	North British Locomotive Co. Ltd.
Radiators	Serck Limited
Blowers	Aerex Limited
Battery	Nife Batteries Limited
Main Compressors and brake equipment	Davies & Metcalfe Limited
Auxiliary compressors	Reavell & Co. Ltd.
Exhausters	Westinghouse Brake & Signal Co. Ltd.
Wheels and axles	Taylor Bros. & Co. Ltd.
Buffers and springs	G. Turton Platts & Co. Ltd.
Spring drives	Brown-Boveri & Co. Ltd.
Axleboxes	Skefko Ball Bearing Co. Ltd.
Windows	Beckett Laycock & Watkinson Limited
Therglass screens	Verres Industriels S.A. Montier J.B.
Pantographs	J. Stone & Co. (Deptford) Ltd.
Air-blast circuit breakers	Brown-Boveri & Co. Ltd.
Cab instruments	Smiths Industrial Instruments Limited J. Stone & Co. (Deptford) Ltd. Nalder Bros. & Thompson Ltd.
Cable	Pirelli-General Cable Works Limited

EAST ANGLIAN RANGER TICKET.—The Great Eastern Line of the Eastern Region, British Railways, has announced that its East Anglian Ranger Ticket, introduced for the first time last year, is available this year until October 28. It offers six days unlimited rail travel anywhere in East Anglia from all stations on the Great Eastern Line. The ticket starts on a Sunday morning and finishes on a Friday evening. It is not valid for Saturday travel. The ticket is available for both first and second class travel, the cost being £3 5s. second class, and £5 first class. Children under three years of age travel free and those from three to under 14 years of age at half fare.

SPICERS LIMITED MOBILE EXHIBITION.—Spicers Limited has fitted out a trailer caravan as a mobile exhibition of Carbion packaging material which started out on an extensive tour from its Loughton works on April 5. Carbion is made by passing strawpaper or a similar suitable base through a special machine which, under the action of pressure and heat, permanently imparts a double-wave pattern to it. If the pattern is dense, it can support considerable loads without deforming, while the more widely spaced pattern yields, but regains its shape when the load is removed. The dense pattern, known as flexible Carbion, is also elastic and can be stretched over irregularly shaped objects, especially when formed into cylindrical sleeves. The other pattern, called rigid Carbion, is used mainly for interleaving and case-lining. Among the calls already made was one to the Central Claims & Packaging Organisation of the British Transport Commission at Eversholt Street, London, N.W.1, which has been responsible for approving several Carbion packs for rail transport.

CHARTER SERVICES SUGGESTED ON G.C.R. MAIN LINE.—The Great Central Association, a body recently formed to watch the interests of those who use the former Great Central Railway main line, now part of British Railways, London Midland Region, is reported to be considering hiring and operating diesel railcars to improve passenger services on the route. The proposal was discussed at a public meeting at Nottingham organised by the Association. British Railways had been asked to improve passenger services, over the route, but, it is stated, had replied that this was not possible. The chartering of railcars was then suggested. British Railways is understood to have asked the Association to draw up skeleton timetables so that costs could be worked out, but it was made clear that, as diesel units were in great demand, there was little prospect of obtaining any for two years.

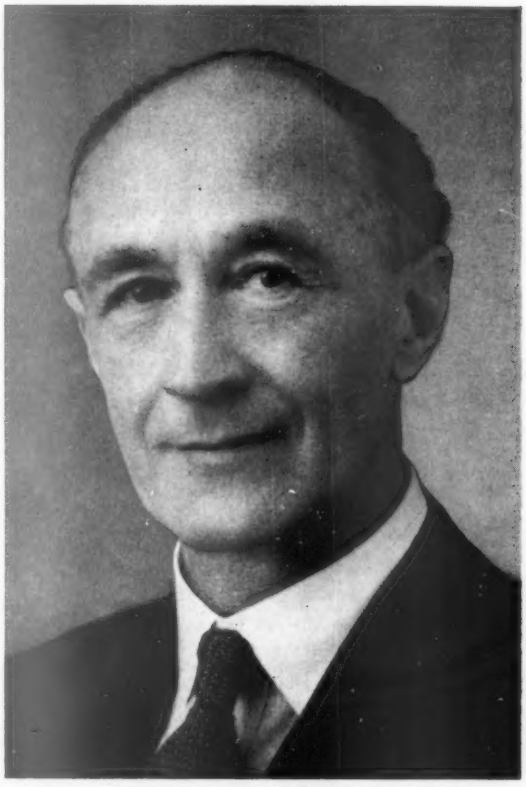
BRITISH TRADE FAIR, NEW YORK.—The British Trade Fair will be held in the Coliseum, Columbus Circle, New York, from June 10 to 26, 1960. It is being organised by the Federation of British Industries, whose President is Mr. W. H. McFadzean, Chairman of British Insulated Callender's Cables Limited. The B.I.C.C. exhibit will emphasise the international nature of its activities. To this end, displays of the products of other B.I.C.C. Group members will be included on the stand. Among the products on display will be a sample of the 138kV. Vancouver submarine power cable, which was manufactured in continuous lengths of over 16 miles and installed for the British Columbia Electric Co. Ltd.

RAILWAY NEWS SECTION

PERSONAL

Mr. Stanley Johnson, Chairman & General Manager, Singapore Harbour Board, has been appointed Assistant Chief Docks Manager, Hull, British Transport Docks.

We regret to record the death on April 19 at the age of 63, of Mr. S. A. Fitch, O.B.E., D.C..M, M.M., Assistant General Manager (Traffic), Southern Region, British Railways. Mr. Fitch joined the South Eastern & Chatham Railway in 1911. He saw active service during the 1914-18 war and, in 1918, received an Infantry commission. On demobilisation he was appointed to the Office of the Superintendent of the Line. From 1924 to 1938, he held various positions with the Southern Railway, including those of Assistant Stationmaster, Victoria; Assistant Agent, Nine Elms; Assistant to London Central Divisional Superintendent, and Assistant Divisional Superintendent, London East and London West Divisions. He subsequently became General Assistant to the Traffic Manager. When the 1939-45 war broke out he was posted to the Aldershot Command as Railway Liaison Officer, returning to his former position after the evacuation from France, and later becoming Acting General Purposes Officer to the General Manager. Mr. Fitch, who had recently been appointed an M.B.E. became Deputy-Director (Railways), 21st Army Group, with the rank of Colonel, and for services in North-West Europe was awarded an O.B.E. (Mil). On his return to the Southern Railway in 1945, he was appointed Assistant Superintendent of Operation. In 1946 he was one of a party of Southern Railway Officers which visited the U.S.A. and Canada to study developments in diesel traction. Mr. Fitch became Assistant Operating Superintendent, London Midland Region, in 1949, and was appointed Superintendent of Operation, Southern Region in 1954. The designation of the latter appointment was changed, shortly after, to that of Chief Operating Superintendent. He became Assistant General Manager (Traffic) in 1958. Mr. Fitch was a past Member of the Council of the Institute of Transport. He was recently created an Officer of the Order of the Etoile Noir, on the occasion of the State visit to Britain of General de Gaulle, President of the French Republic. The funeral takes place at 10.30 a.m. today, April 22, at St. James's Church, Friern Barnet, followed by cremation at St. Marylebone Crematorium at 11 a.m.



The late Mr. S. A. Fitch

Assistant General Manager (Traffic), Southern Region, 1958–60

Mr. R. A. Sadique

Appointed Chief Traffic Manager, Eastern Bengal Railway

Mr. Cecil Garstang has been appointed General Manager, Thos. Cook & Co. Ltd., in succession to Mr. Charles Holt, who was appointed Managing Director in July last year. In addition to his General Management responsibilities Mr. Garstang will deal with the problems arising from the development of the company's business at home and overseas, in conjunction with their associates, the Wagons-Lits Company. In particular he will be in control of planning. He will deputise for Mr. Holt, who remains Chief Executive of the Group, when Mr. Holt is overseas.

Mr. A. G. Webster, Goods Agent, Glasgow Buchanan Street, Scottish Region, British Railways, has been appointed District Traffic Superintendent, Ayr. He succeeds Mr. J. R. McBeath, who has been appointed District Goods Manager, Glasgow.

Mr. R. A. Sadique, M.Sc., Director of Traffic, Railway Division, Pakistan, who, as recorded in our April 8 issue, has been appointed Chief Traffic Manager, Eastern Bengal Railway was born in 1912, and obtained his M.Sc. degree from Lucknow University. He entered the State Railway service in 1935 as a probationer, on the East Indian Railway. Until May, 1947, he worked in various capacities including Assistant Superintendent (Commercial); Superintendent (Commercial); Research Officer, and Traffic Survey Officer. In 1947 he opted for Pakistan, and was transferred to the North Western Railway as a Claims Officer. In 1951 he was promoted to be Deputy General Manager (Personnel). Mr. Sadique was transferred to the Railway Division, in 1958, as Joint Director, Traffic, subsequently becoming Director Traffic, the position he held till his present transfer.

Mr. R. R. Skinner, Deputy Regional Manager, Canadian Pacific Railways, Rome, has assumed jurisdiction of Madrid, Lisbon and the Azores offices of the company. Mr. Luis Andrade is appointed District Sales Manager, Spain, with headquarters in Madrid. Mr. H. Simoes becomes District Sales Manager, Portugal and the Azores.

Mr. M. H. Harbinson

Appointed Planning Officer (Electrification & General), Eastern Region

Mr. M. H. Harbinson, Passenger Assistant, Regional Traffic Headquarters, Liverpool Street, Eastern Region, British Railways, who, as recorded in our April 1 issue, has been appointed Planning Officer (Electrification & General), General Manager's Office, Liverpool Street, joined the London North Eastern Railway, in 1946, after war service in the Royal Artillery. He was selected as a Traffic Apprentice and, after training in the Commercial, Operating, Locomotive Running and Docks Departments, was appointed Assistant Yardmaster at Annesley. He subsequently transferred to the District Superintendent's Office, Lincoln, as Chief Trains Clerk & Chief Controller, and in January, 1951, was appointed Assistant to the District Operating Superintendent, Manchester (Eastern Operating Area), having previously occupied the position for over a year in an acting capacity. In this position, he was closely associated with the Manchester-Sheffield-Wath electrification scheme. Mr. Harbinson later moved to the General Manager's Office, Liverpool Street, as Assistant (Works Section), dealing with electrification and other modernisation projects. In 1955 he became Deputy Trains Assistant to the Chief Operating Superintendent, Eastern Region. In 1956 he was seconded for special duties in connection with the formation of the new traffic organisation in the Eastern Region, in which he was appointed Passenger Assistant at Regional Traffic Headquarters, Liverpool Street, in April 1957, which position he vacated on taking up his present appointment.

Mr. Allan Yeaman, former Traffic Manager, Northern Division, Scottish Region, British Railways, whose retirement was recorded in our March 4 issue, was recently entertained by the Scottish Area Board, British Transport Commission. The Chairman of the Board presented Mr. Yeaman with a certificate recording the congratulations and thanks of the Board and Management for many years of loyal service given to the railway industry.

Mr. J. A. Kruger, Assistant General Manager (Operating), South African Railways, has been appointed Assistant General Manager (Staff). Mr. P. G. Joubert, Assistant General Manager (Commercial & Road Transport), becomes Assistant General Manager (Operating). Mr. R. H. Tarpey, System Manager, Johannesburg, succeeds Mr. Joubert as Assistant General Manager (Commercial & Road Transport).

Mr. M. G. Burrows, Chief Mechanical & Electrical Engineer, York, North Eastern Region, British Railways, will now control the road motor engineering work in the North Eastern Region and Mr. J. Don has been appointed Road Motor Engineer in the Department of the Chief Mechanical & Electrical Engineer. The road motor engineering work was previously under the bi-regional control of the Road Motor Engineer, Eastern and North Eastern Regions, Kings Cross.

Mr. A. W. Geuer, Assistant Comptroller of Accounts, Victorian Railways, has been appointed Comptroller of Accounts. Mr. L. M. Williams, Auditor of Expenditure, becomes Assistant Comptroller of Accounts.

Mr. P. A. White has been appointed a Director of Maidstone & District Motor Services Limited. He succeeds Mr. W. H. F. Mepsted, who has resigned.

Mr. A. E. Purnell, Assistant District Operating Superintendent, Newcastle, North Eastern Region, British Railways, has been appointed District Operating Superintendent, Wakefield.

Mr. A. D. R. Watson, Assistant (New Works & Modernisation), Chief Civil Engineer's Office, Kings Cross, Eastern Region, British Railways, has been appointed District Engineer, Inverness, Scottish Region.

Mr. W. I. Jones, an Assistant Engineer (Civil), New Zealand Government Railways, has been awarded a scholarship by the Federation of British Industries. He will be attached to the Scottish Region of British Railways.

Mr. Miles B. Reid has resigned from the board of Mobil Oil Co. Ltd.

Mr. John Booth, General Manager of Central Wagon Co. Ltd., has been appointed an Executive Director.

Mr. I. M. Phipps has been appointed a Director of the Tilley Lamp Co. Ltd., and the Rev. F. W. Tilley has resigned from the board.

Mr. W. A. Moens, Sales Manager, National Sales, Dunlop Rubber Co. Ltd., has retired after 34 years' service with the company.

Mr. David Radford has been elected Chairman of the British Plastics Federation. He succeeds Mr. N. B. Punfield. Mr. Finlay Walls becomes Vice-Chairman.

Mr. J. A. Rodgers, Assistant Sales Manager (Mining), British Insulated Callender's Cables Limited, has been appointed Divisional Sales Manager (Accessories).

Mr. W. J. Wyers has been appointed Products Assistant Chief Designer, Research & Development Department, Rubery Owen & Co. Ltd.

The Dowty group has announced the board of Directors of its subsidiary Dowty Rotol Limited. They are Sir George Dowty Chairman. Mr. C. J. Luby and Mr. E. J. Nicholl, Joint Managing Directors; Mr. L. T. P. Banbury, Mr. R. F. Hunt, Mr. A. E. Atkins, Works Director; Mr. H. S. Butt, Experimental Works Director; Mr. L. G. Fairhurst, Technical Director; Mr. F. J. A. Mangeot, Commercial Director, and Mr. G. F. M. Rufford, Financial Director.

Mr. R. L. Charlesworth

Appointed Commercial Officer, Western Region

Mr. R. L. Charlesworth, O.B.E., M.A., A.M.Inst.T., Assistant to the General Manager, Western Region, British Railways, who, as recorded in our April 1 issue, has been appointed Commercial Officer, was educated at Winchester and Hertford College, Oxford. Mr. Charlesworth joined the London Midland & Scottish Railway as a Traffic Apprentice in 1933. He served the normal four-year training and after two years as a runner, was appointed Acting District Controller at Huddersfield on the outbreak of war. He was commissioned in the Royal Engineers in January, 1940, and served in France with 153 Railway Operating Company, and spent two and a half years as Staff Officer in the Middle East, being mentioned in despatches for service in the Western Desert. In 1943, Mr. Charlesworth was appointed Deputy Assistant Director of Transportation, 21 Army Group, and subsequently served in France, Holland and Germany, being promoted Assistant Director of Transportation. Later he was in command of No. 1 Regional Railway Control Team at Osnabruck, with the acting rank of Colonel, and was awarded the O.B.E. for services in North West Europe. In 1946, he became Assistant District Goods & Passenger Manager, Bristol, London Midland & Scottish Railway and, in 1947, Steamship Superintendent, Belfast. He was made a Traffic Costing Officer at British Transport Commission Headquarters in 1951, and was subsequently appointed Principal Traffic Costing Officer, Paddington. In 1957 he became Assistant to the General Manager, Western Region. In 1955, Mr. Charlesworth was a member of the team of British Transport Commission Officers who went to Ceylon for two months to advise on the Ceylon Government Railways. He holds the rank of Colonel in the Royal Engineers' Army Emergency Reserve.

Major Victor B. J. Seeley has been elected to the board of Acrow (Engineers) Limited.

Mr. B. Sharp is retiring from Brooke Tool Manufacturing Co. Ltd. and has resigned from the board.

Mr. W. J. Walpole has been appointed Managing Director of Lumenated Ceilings Limited, a member of the Hall-Thermotank group. He has been a Director of the company since January, 1958.

NEW EQUIPMENT AND PROCESSES

Clearance of Ice and Snow

CALIDEC electrical floor warming equipment for all sizes of industrial building may also be applied below ground for the clearance of ice and snow at station approaches.

By this means it is possible to eliminate a cause of danger and inconvenience to passengers and, on steep road-vehicle ramps in exposed places, to avoid traffic congestion which otherwise might occur, particularly on winter mornings.

The illustration shows a successful experimental installation being made at a railway station site which is prone to obstruction by snow. The cables are embedded in sand on which standard 3-ft. x 2-ft. concrete slabs 2-in. thick are placed. The current is switched on whenever a snow warning is given in the meteorological forecast.

Further details may be obtained from Calidec Limited, Station Approach, Solihull, Warwickshire.

Anti-corrosion Paint

VITA-VAR stainless-steel paint No. 13448, for steel and weathered galvanised iron will shortly be available in the United Kingdom. It was developed in the United States by the Vita-Var Corporation of Newark, New Jersey.

The paint contains a mixture of stainless steel flake (18 per cent chromium and 8 per cent nickel) and several non-metallic pigments in a long oil alkyd resin vehicle. Its use on transmission towers exposed to highly-corrosive atmospheres is claimed to have shown that it will afford protection to steel and iron structures for at least 12 years. It is designed for use as a finishing coat and when first applied it is medium grey in colour with a semi-gloss finish. After about two years, it becomes lighter and brighter in appearance and closely resembles uncoated stainless steel. Bare metal should be primed with a Vita-Var corrosion-resistant primer No. 14142. With galvanised iron, the metal is coated with a red-Vita-Var primer No. 14399. It is not necessary to prime galvanised iron which has been previously painted provided that the old coat is in good condition. Mineral spirits may be used as a thinning agent.

One gal. of top coat and both types of primers will cover an area of 450—500 sq. ft. The stainless-steel base gives the paint its very high protective qualities against corrosion. In addition, a very smooth finish is obtainable which sheds dust and dirt. Annual maintenance costs of many types of plant are claimed to be reduced by 30 per cent in tests conducted by the manufacturer.

Further details may be obtained from Anthony Edwards & Associates, 57, Talgarth Road, London, W.14.

Overhead Travelling Crane

THE Overlord range of four-motor overhead travelling cranes with capacities of 2–10 tons incorporates as standard many refinements normally found only on expensive installations and yet it is claimed by the manufacturer that prices are most competitive and efficiencies and safety factors are high.

On each size of crane a heavy-duty electro-mechanical clip-type brake operates on a cast-iron drum at the non-driving end of the shaft of the hoist motor. An oil-tight gear case encloses oil-toughened alloy-steel gears in the hoisting mechanism. Limit switches are shunt type operated by rope guide or rotary switch on the main transmission shaft. Control circuit voltages can be as low as 25V. and a complete protective panel includes one fuse in each phase of each motor, an interlocked isolator and a triple-pole circuit breaker.

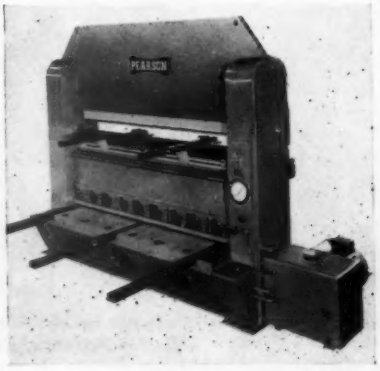
One track wheel on each end carriage is driven by a flange-mounted electric motor completely enclosed, continuously rated, and arranged for poly-phase supply to give starting conditions suitable for a wide range of applications. There is a special system of axle adjustment to simplify alignment during erection. The hoist and cross-travel motors have rotors which are claimed to be indestructible ; creeping speeds for these are available if specified by customers.

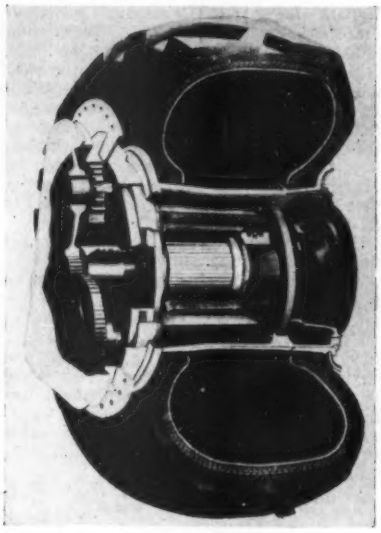
Rolled-steel I-section cross girders with steel rails support a crab and hoist barrel of compact dimensions which is stated to give good hook approach and make the best possible use of available space. The hook block is of drop-forged steel and mounted on a ball-bearing thrust race.

Further details may be obtained from Anderson Clyde Engineers Limited, Irk Vale Works, Chadderton, Manchester.

Combined Press and Guillotine

A COMBINED flanging press and guillotine shear should be of particular value in smaller factories where both space and cost are of prime importance, and in the maintenance departments of larger organisations. The shear operates on the normal down-stroking principle and the press is up-stroking. The combined machine thus gives the user advantages in saving of floor space and in capital outlay as it is claimed to be substantially lower in price than would be the two separate units of similar capacity. Four models are available; sizes range from a 100-ton press and 8-ft. x ⅜-in. shear to a 125-ton press and 10-ft. x ½-in shear.





Further details may be obtained from the Pearson Machine Tool Co. Ltd., Walker, Newcastle-on-Tyne, 6.

Motorised Wheel

LOAD-CARRYING vehicles fitted with self-powered wheels and 10-ft. dia. tubeless tyres, supplied with current from a diesel generator or overhead trolley, should be capable of operation at speeds of up to 35 m.p.h. with exceptional manoeuvrability, hauling loads of more than 50 tons over off-track civil engineering sites with extremely rough terrain and gradients of up to 10 or 15 per cent.

Each wheel can develop 380 h.p. at the rim giving a total of 1,520 h.p. for a vehicle with four driving wheels for which no conventional driving shafts, axles, or differential gears are required. The self-powered wheels may be placed exactly where they will function to the best mechanical advantage. If one wheel tends to spin in loose mud or snow the current supplied is automatically decreased and that fed to the wheels which have good purchase is increased. Dynamic braking can be incorporated in the design of the vehicle.

Advantages of electric traction are that full engine horsepower is available over the entire speed range of the vehicle, stalling does not occur if a momentary excess load is met, and the maximum available tractive effort can be two or three times the rated tractive effort for one min. without damage to the driving mechanism. Torque reaction is carried through the large mounting flange secured to the vehicle structure and the drive is by a train of gears enclosed in the hub.

Further details may be obtained from the International General Electric Company, 150, East 42nd Street, New York 17, U.S.A.

Institution of Railway Signal Engineers

Mr. W. Owen, Senior Executive Assistant, Signal Engineer's Department, London Transport Executive, gave his Presidential address to the Institution of Railway Signal Engineers when he was installed in the chair at the annual general meeting on April 6. He stated that his remarks that evening on maintenance must necessarily be confined to signalling practice on the London Transport lines, for that was where he had gained his signalling experience during the past 30 years. His address is the subject of editorial comment on page 473.

For the purpose of calculating failures per unit, he stated, one unit had been allotted as : one signal or one train stop, one point layout or one track circuit, one insulated rail joint or one working shaft or lever or one point heating layout. He explained that the design of new equipment and apparatus had a direct influence on signal failure reduction. The new equipment was such that it could be installed with the assurance that it would function for a given period with the minimum of maintenance and without any form of site repairs.

L.T.E. Train Stops

The train stops used on the L.T.E. Underground lines formerly consisted of a long base plate with an air cylinder at one end, arranged to push a spring-loaded rod which operated a crank mounted on a horizontal shaft at the forward end of the base plate. The train stop arm was fitted to this shaft. All bearings were of the plain journal type open to the weather. Failures could only be reduced to a minimum by frequent oiling and examination. The circuit controller for proving the fidelity of the head of the train stop arm was fitted separately and joined by a connecting rod. Various pieces had to be disconnected and handled when a train stop needed changing.

Constant improvements had been made to the design of this layout and at the present time all the operating parts were included in one case. The bearings, Mr. Owen stated, were of superior design and all moving parts were constantly lubricated from an oil pump and reservoir in the bottom of the case.

The circuit controller for proving the train stop was a sealed unit contained inside the case and was supplied with a quickly released cable entry and connections. To remove this unit it was necessary only to remove and replace four nuts besides the electrical and compressed air connection. This latest design in train stops would operate satisfactorily for five years. After this period it was removed whether it required shop service or not.

Connections to Equipment on Track

Connections to track equipment used to be made by cables run in concrete troughing, but present practice was to use a screened ten-core cable with pre-formed connections at the end and moulded in position. Train stops installed on open sections of the railway were liable to failure in the winter season by the formation of compacted snow jamming the train stop arm.

A bellows was fitted at this vulnerable position which operated with the movement of the train stop arm, blowing the snow away. Snow and ice were liable to cause point failure, particularly in blockage of the slide chairs. This was overcome by pumping hot oil through cavities in the slide chairs and through pipes in contact with the point mechanisms.

The Signal Department of the L.T.E. Underground had also adopted pre-fabrication for new works. The colour-light signal was now a standard item of equipment and had long since replaced the former air-operated semaphore signal. The apparatus necessary for a signal was now fitted into a common case and this also included the air valve for the train stop. The apparatus inside the case was pre-wired in the signal shops and at site it was only necessary to connect the air supply and external cables.

Programme Machine

After mentioning other items of standardised equipment Mr. Owen went on to discuss the programme machine which had permitted the automatic control of signalling in accordance with a time table and the supervision of a whole tube line. The longest tube line in the world, the Northern Line, was already automatically operated by programme machine and supervised from a central position.

Mr. Owen explained that this system removed the control of the signalling from the operator and all mental and physical effort had been eliminated. The control of the signalling had been placed on the machine and it was only necessary to provide an observer or regulator to intervene in cases of emergency. He visualised the development of the programme machine for the control of complicated yard layouts and train movements such as those encountered in rolling stock marshalling yards.

The simple signalling circuit used in the early part of the century had developed into a highly complicated system and standardisation of circuits and unit application had been adopted as widely as possible. The rate of progress in the development of signalling equipment had accelerated in recent years and would become even faster as the coming years approached. The wayside signal might be replaced by cab signals and some of the more conventional methods of signalling now so well understood might eventually disappear.

Such developments would not minimise the signal engineer's work, but would make it even more complex. The practical problems could be easily overcome but theoretical difficulties would require staff with a wide scientific knowledge. In many signal engineers' departments and technical institutions, signalling classes were held culminating in an examination. Mr. Owen envisaged the institution of technical courses in railway signalling and allied subjects which would enable students to qualify by examination for a diploma or National Certificate such as was given for other subjects at the present time.

Coil Spring Federation Research Laboratories

Research work of the spring industry centralised at Sheffield

The laboratories of the Coil Spring Federation Research Organisation at Sheffield were opened recently by Sir Harry Melville, Secretary of the Department of Scientific & Industrial Research. The organisation was formed in 1945, but until 1957 all research was undertaken extra-murally by universities. The main research work of the Federation is now concentrated in the new laboratories.

Wide Range of Subjects

Subjects for research are submitted by subscribers. Those at present under investigation include: factors affecting the fatigue life of heavy-duty springs; properties of nickel alloys for springs; effect of non-metallic coatings on fatigue life; springs made in copper-beryllium and titanium; and those for use under severe corrosion or extreme temperature conditions.

Heavy mechanical testing equipment, electro-plating plant, heat-treatment furnaces, and stores are on the ground floor. On the first floor are small testing machines, optical instruments, photographic equipment, administrative offices and conference room. Both floors are fully suspended and insulated against vibration and noise.

Fatigue testing equipment occupies the

Multiple-spring dynamic-testing machines, built at Derby Locomotive Works, British Railways, London Midland Region

major portion of the mechanical test laboratory; the material tested ranges from wire of 0·004 in. dia. to bar of 2 in. dia. Two identical machines, built at British Railways, London Midland Region Works, Derby, are used for the dynamic testing of vehicle springs at 9 tons load and 120 cycles per min. These are multi-station machines, fully balanced, driven by a 12½-h.p. motor. Each machine takes nine springs. On the successive failure of each spring the machine automatically stops. The fatigue characteristics of small-dia. specimens are determined on a Haigh-Robertson rotating-beam machine, with a capacity of 100 million cycles a week. There is a variable-strain-rate static-torsional test machine, with a torque capacity of up to 120,000 lb.-in.

Surface Treatment Research

Research on the effect on spring characteristics or surface treatment includes shot-peening, widely used to increase fatigue strength by inducing a compressive surface stress. This is being investigated for optimum jet velocity, size of shot, and other variables.

For research on metallic protective platings for corrosion resistance a complete electro-plating plant has been presented by W. Canning & Co. Ltd. Investigations into application of non-metallic coatings such as pvc and Bakelite are dealt with at the Imperial College, London.

The heat-treatment laboratory includes a small platinum-wound furnace with a temperature range of 20°—1,400° C., and furnaces with controlled atmosphere to eliminate decarburisation.

In the instrumentation section a Vickers projection microscope of 5,000 magnification is equipped for micro-hardness testing and photo-micrography.

Meeting of U.I.C. Board of Management

Manufacture of motive power and rolling stock considered in comprehensive agenda

The Board of Management of the International Union of Railways (U.I.C.), which is entrusted with the administration of the U.I.C. and the task of taking decisions of general application in accordance with the policy laid down by the General Assembly, held its 53rd session at the General Secretariat in Paris on March 14.

The Board is composed of 12 member administrations: Chairman administration, Western Germany (German Federal Railway); seven Vice-chairmen administrations, namely Czechoslovakia, France, Eastern Germany (German State Railway), Great Britain, Italy, Poland, Sweden and Switzerland (Swiss Federal Railways); and three others: Belgium, the Netherlands and Spain. It meets three or four times a year, depending on the number of important questions submitted.

Dr. H. M. Oeftering, Senior Chairman of the German Federal Railway, presided. He was supported by Monsieur J. Tuja, Secretary General, and Monsieur P. A. Rousseau, Chief Executive Officer of the Union.

The following railway officers attended the meeting:

Belgium: Monsieur M. de Vos, General Manager, and Monsieur A. Adam, Manager, S.N.C.B.;

Czechoslovakia: Monsieur Kos, Chief of the International Section, and Monsieur Hlava, Deputy Chief of the International Section of the Ministry of Transport;

France: Monsieur P. Dargeou, General Manager, S.N.C.F., and Monsieur Camille Martin, Head of the Motive Power & Rolling Stock Department, S.N.C.F., and Chairman of the Fifth Committee of the U.I.C.;

Western Germany: Dr. Fritz Schelp, Chairman, and Dr. Hennig, Ministerial Adviser, German Federal Railway;

Eastern Germany: Herr Scholz, Vice-Minister, and Herr Mrossko, Principal Adviser, German State Railway;

Great Britain: Mr. John Ratter, Member, B.T.C., and Mr. G. M. Leach, International Traffic Officer, B.T.C., and Chairman of the First Committee of the U.I.C.;

Italy: Signor S. Rissone, General Manager, Italian State Railways, and Signor M. Cirillo, Chief Operating Manager, Italian State Railways, and Chairman of the Fourth Committee of the U.I.C.;

Netherlands: Mr. J. Lohmann, Chairman, and Mr. D. J. Wansink, General Manager, Netherlands Railways;

Poland. Monsieur Tarantowicz, Under Secretary of State, Ministry of Communications;

Spain: Señor Puig-Batet, General Manager, and Señor F. de Reparaz, Secretary General, R.E.N.F.E.;

Sweden: Mr. E. G. J. Upmark, General Manager, Swedish State Railways;

Switzerland: Dr. H. Gschwind, Chairman, Swiss Federal Railways.

Agenda

The principal items on the agenda were : (*a*) new U.I.C. headquarters, (*b*) work of the committees, and (*c*) organisation of the work of committees and offices, centres and bureaux.

As to the first, the Board was informed of the progress of the administrative formalities and of the study of plans for the construction of the new premises in Paris.

Work of the Committees

Reports of the work of the Second Committee meeting (Goods Traffic) in Paris in November, 1959, and the Sixth Committee (General Studies) at Wiesbaden in October, 1959, were submitted to the Board of Management which approved the conclusions of both meetings.

While discussing this matter, the Board paid particular attention to the reports of the Sixth Committee on railway productivity and co-ordination of investments and also to the studies made by the Second Committee for an international transit tariff and for effective tariff collaboration between the railway administrations.

A preliminary report drawn up by a Fourth Committee Working Party, on modernising the international conveyance of goods, was considered. The Board approved the report in principle and, in particular, the suggestion for an international network of through goods trains. It requested the Working Party and the Fourth Committee (Operating) to continue their studies and submit a new report at its next session.

Organisation of Work

In a comprehensive report the Secretary General summarised for the Board of Management the proposals made by various officials, including the chairman of the committees, offices and centres for additional measures which seemed advisable in connection with the structure of the U.I.C. decided on in 1958.

The Board also took a number of decisions of principle mainly connected with the Heads of Departments taking part in the work of the U.I.C. and the functioning of the Office for Research & Experiments (O.R.E.).

At its forthcoming sessions the Board will give further attention to this question on the basis of a new report by the Secretary General.

Specifications for Railway Material

In addition it discussed matters such as the extent to which the manufacturers of motive power, rolling stock and other railway material should be consulted in working out U.I.C. specifications, and the sale of manufacturing rights for standard diesel locomotives. The Board also agreed that the Mali Federation Railways should be admitted to to membership of the U.I.C. and the O.R.E.

Photo] ["*La Vie du Rail*"

At the 53rd meeting of the Board of Management of the U.I.C.: top table (left to right): Messrs. P. A. Rousseau; J. Tuja; Dr. H. M. Oeftering; Messrs. J. Ratter; J. M. Leach

Parliamentary Notes

Wide Terms of Reference of Advisory Group on Transport

Report not to be published. Close co-operation of B.T.C. and "continuous consultation" with Minister of Transport

A debate of three hours took place in the House of Commons on April 13 on the powers and procedure and composition of the "small group of advisers" on nationalised transport, whose report, it was intimated by Mr. Ernest Marples, the Minister of Transport, was not to be published and would be for the information and guidance of the Government.

The debate was made possible by the Vote of the Ministry of Transport estimate for 1960-61 of £1,250,000, to which the Opposition moved a reduction of £100 as their indication of "no confidence."

Mr. Alfred Robens (Blyth—Lab.) said two very great interests were involved. One was the interest of 800,000 people who worked in the industry, and their dependants. Probably 2,000,000 people in all were involved. The other was nationalised transport with a turnover of £700,000,000 "an industry which, for strategic and social purposes, must be maintained irrespective of profit, is one which has a tremendous effect upon the economy of the country."

The Government, Mr. Robens stated, was now in a position in which there was undoubtedly a desire to cream off the hotels, and prevent British Railways from developing its most valuable property sites throughout the country. One could only draw the conclusion that the Advisory Group was a screen for Government action and policy; and that because of differences as to presentation the Government found that this was the most expedient way in which to do it.

Cost of Railway Labour

Mr. Ernest Marples emphasised that the final report of the Guillebaud Committee would add to the costs of the B.T.C. and that the costs would be borne by the taxpayer. A fair deal must be given to the railwayman and, as the Minister responsible, he did not see why the railways should hire their labour at costs cheaper than those in outside industries.

Speedy Action Required

If the B.T.C. was to undertake the work, it would be the judge in its own cause. It had so much to do with the problem from day to day that it was better to have someone fresh with a new approach and possibly able to see the wood for the trees. More than anything else, they wanted speed, because with the loss running at those rates, they had to move fast. The Government, therefore, decided on a small group of outside advisers with experience, who would not simply spend half a day or a few hours a week, but virtually most of their time on the job. In the meantime, the B.T.C. would be run by a very competent man.

The terms of reference of the Advisory Group, he added, were very flexible and wide.

Mr. Marples continued: The Advisory Group will be in continuous consultation with myself. I shall see its members every week or every fortnight. They will be treated like top civil servants, with two exceptions. First, they have the knowledge of outside industry, and, secondly, they are not being paid. Apart from that, they will be treated in the same way as a Minister treats the top civil servants. I shall see them and help them all I can in any of their difficulties.

If, for example, after a month the members of the Advisory Group said that they would like some restrictions to be removed from the B.T.C., if it was possible to do it administratively the Government would make the decision and remove those restrictions. If legislation is needed, the Government will give instructions for it to be drafted; and if a Bill is necessary, it will be introduced.

Report not to be Published

It was not intended, he said, to publish any reports. There were precedents for this.

The Minister went on to cite various precedents. He said that he had seen Sir Ivan Stedeford (the Chairman of the Group) the previous day. The Group had already held its first meeting. Sir Ivan Stedeford would invite the Commission and the interested unions to see him and he would invite all the interested unions, of whom there were quite a number, either together or separately as they chose; the choice was theirs. In this way, the views of the unions would be considered in two different ways. First, the advisers would listen to them before they tendered their advice. Secondly, before the Government took a decision, the unions again would be consulted. There would, therefore, be full consultation.

Consultation with B.T.C.

The Chairman of the B.T.C., Sir Brian Robertson, had been consulted throughout. Mr. Marples stated that he had seen the whole Commission. Its members had promised their absolute co-operation to help the Government to see whether they could streamline the railways to modern needs. At one time, they had thought of having the B.T.C. represented on the Advisory Group, but ultimately came down against that scheme, and the Commission had accepted it.

Railways Essential

The Commission, Mr. Marples pointed out, had had a difficult time, largely because transport had changed at bewildering speed. It had gone from mass transport at set times between two set points and had yielded to individual transport at any time between any two points. The motorcar and other inventions had played havoc with the railways, not only in this country, but in the world as a whole. They could not do without railways, small as the country was, with its large population. They were essential for the commuter service, for example, in London, where public transport brought in 94 per cent of the people. They needed them abroad also, as they had found in America.

The Minister was interrupted with the question: "Why is this report to be secret?" He did not reply.

Advisory Group "Unwanted"

Mr. Ernest Popplewell (Newcastle-on-Tyne W.—Lab.) said the transport industry had been subjected to more inquiries than any other industry. The Minister knew what was really at stake. It was the complete failure of the 1953 Act, which had attempted to de-centralise and de-nationalise to a certain extent the transport industry. He appealed to the Government to withdraw the proposal for an advisory board. It was an unwanted child.

Harmonising Forms of Transport

Mr. Ray Gunter (Southwark—Lab.) recalled that Sir Eric Geddes, a Coalitionist who knew all about railway management, had said 40 years ago: "The State must harmonise the operation of the different agencies of transport as between themselves in the interests of the community as a whole. Under a system of competition not only did one railway or one dock strive to divert traffic from another, but trams sought to wrest traffic from the railways, railways to wrest traffic from canals, coastal services to wrest traffic from both, and so on and on."

Sir Eric Geddes had added what every transport man knew by heart: "In future our effort will be to encourage each agency of transport to undertake that part of the total work which it, owing to its own special qualities, can most efficiently and economically perform."

That was the principle, Mr. Gunter stated, on which the transport industry should be based, and no advisory group of four men could get away from it.

Closure of Glasgow Central

Mr. F. J. P. Lilley (Kelvingrove—U.) suggested to the Advisory Committee to the Advisory Group that it was possible to close down Glasgow Central Station. Better and more secure handling of traffic going from St. Enoch Station would remove the troubles and bothers of wagons, or trains and their carriages, standing at the station.

If his suggestion were adopted, Glasgow Central Station, completed with present day automation in car stacking, could be of advantage to Glasgow. Other cities could do the same. Such action would produce a revenue for the railways from car stacking. It would prevent the headaches experienced by the local authority, the police, and drivers looking for parking facilities.

Continuance of Railway Subsidy

Mr. Walter Monslow (Barrow-in-Furness—Lab.) said that the Government should face the stark reality that they had previously accepted as, perhaps, a concealed subsidy, which would continue for all time.

Sir Richard Nugent (Guildford—C.): The main problem to decide is: What do we want the railways to do in the next 20 or 30 years? At present, we have a situation where the railways are not giving satisfaction, are costing us large sums of money and have an annual loss on average of about 20 per cent overall on all operations. It is quite obvious from that figure that there are many operations which the railways are carrying out today which must be making an enormous loss. There are also operations which are making a profit. Somehow, someone has to disentangle them, the economic from the uneconomic. What the Minister of Transport needs from the Advisory Group is just that analysis of what there is that is economic and potentially economic and what is uneconomic.

Mr. Macmillan on G.W.R. Board

Mr. Wedgwood Benn (Bristol S.E.—Lab.) recalled that the Prime Minister, Mr. Harold Macmillan, was appointed a Director of the G.W.R. in 1929 when the company was paying 7½ per cent on its dividends. A year later, that is, after one year's work by him, the dividend dropped to 5 per cent. After the second year the dividend dropped to 3 per cent, and in the fourth year the dividend dropped so low that the G.W.R. could pay only 3 per cent by dipping into reserves. That was the year in which the G.W.R. asked for a 10 per cent wage cut to help with its problems. Between

1933 and 1935 the 3 per cent dividend was paid every year out of reserves. But in 1936 the company actually earned its profit.

In 1937, it managed to raise it to 4 per cent by postponing modernisation. It cut £3 million out of its capital requirement programme, and was thus able to pay 4 per cent.

Drop in G.W.R. Dividend

In 1938, the dividend dropped to 0.5 per cent and the G.W.R. lost its trustee status and was considered unworthy to receive the earnings of people under the Trustee Acts. The chairman, when asked why he did not pay the dividend out of reserves, said: "We have paid out £8,000,000 from reserves to dividends in the last 15 years and we cannot pay out any more." That was ten years of good hard work by the Prime Minister with the railways. When he (Mr. Benn) thought of the Battle of Hastings, he was reminded that the Prime Minister was not the only Harold who stuck out his neck and got one in the eye.

The railways were saved by the arrival of the war and by the fact that the Government began to take over railway operations.

Advisory Group Free to Act

Mr. John Hay, Parliamentary Secretary to the Ministry of Transport : The method of working of the Advisory Group is to have its emphasis upon informality and speed. It will be for the group itself to decide how it goes about its task. It will be able to consult anyone it wishes. Sir Ivan Stedeford has already made arrangements to consult both the unions and the Commission.

"Not a Committee of Inquiry"

They were not appointing a committee of inquiry, Mr. Hay added, but an advisory group. It was only right that if the Government took overall responsibility for the outline of its policy, and eventually responsibility for the application in detail of that policy, it should be entitled to choose the advisers it would like. For that reason, they felt there was no necessity to have a representative of, for example, the trade unions.

The Opposition amendment to reduce the Ministry of Transport Vote by £100 was rejected by 293 votes to 226.

Railway Hotel and Other Assets

Mr. David Webster (Weston-super-Mare —C.), in the debate on the Budget proposals on April 7, said that they were asking for more investment in the railways and other aspects of the public sector of the economy.

They must also consider, he added, whether there were not other aspects of the economy where the Government had an interest which it might be advisable to get rid of. There were many assets of the railways, £28 million worth, under no date of valuation that he could ascertain from the B.T.C., which had nothing to do with the running of the railways.

On the same valuation in the present balance sheet £10 million was invested in hotels. If these assets were re-valued, the assets would be found much in excess of the old book value. He was told that the earnings were 14 per cent on the assets at that valuation, but he wondered what the percentage was on the real value of those assets. The Government should investigate this. If they were increasing Government debt so as to modernise the railways, there was a strong case for reducing Government debt tied up in assets which had nothing to do with the running of those things. He was very glad that the Chancellor had said that he intended to dispose of Richard Thomas & Baldwins; that was a way of getting more equity into the equity market and less Government debt.

Financing State Industries

The House of Commons discussed on April 7 and 8 two money resolutions moved by the Chancellor to enable a clause to be included in the Finance Bill to deal with the method of financing the nationalised industries.

Mr. Anthony Barber, Economic Secretary to the Treasury, explained on April 7 that if those two procedural resolutions were not passed, and if the matter was not included in the Finance Bill, the nationalised industries' funds would have to be maintained from the market and guaranteed, as they were before 1956.

Mr. G. Nabarro (Kidderminster—C.) said that in 1956, under Section 42 of the Finance Act of that year, permission was given by the House for the first time for £700 million to be provided from Exchequer funds for the financing of seven State industries, including the B.T.C. The powers were taken for £700 million for two years only. In 1958, the powers were renewed in Section 36 of the Finance Act of that year for a further period of one year.

In 1959, similar powers were taken which renewed the sum of money required for a further period of one year, expiring this year. In the first two-year period, £700 million was involved. For the next period of one year £370 million was involved, raising the figure from £700 million to £1,070 million, and in 1959 the sum of money was again raised from £1,070 million to £1,620 million. The Chancellor proposed to continue this method, stating that he based his decision on the recommendation of the Radcliffe Commission. It had been ruled that under this procedure the nationalised industries could not be discussed on the Consolidated Bill, but only on the Finance Bill.

Mr. Barber, Economic Secretary: Because we consider that this aspect of financing the nationalised industries is so tied up with the general financial and monetary policy of the Government, we think it should be included in the Finance Bill.

Not a Budget Matter

Viscount Hinchingbrooke (Dorset S.—C.) on April 8 said he and several others felt that the financing of the nationalised industries should be taken out of the Budget and the Finance Bill and be used as a separate occasion.

Mr. Barber said that the House gave certain borrowing powers to the nationalised industries. It was only within the limit of the borrowing powers that the House granted that the relevant clause in the Finance Bill would have any effect. That was a fairly good safeguard for Parliamentary control over nationalised expenditure.

Mr. Nabarro insisted that there was not adequate opportunity to discuss the expenditure of nationalised industries in detail. Supply days were given only if the Opposition asked for them. Members had not the opportunity of dealing with the individual capital sums for each of the seven nationalised industries.

The first procedural resolution was passed *nem. con.* and on the second (on the question of public accountability) there was a division, the Government majority being 100 and the minority against 20, including Lord Hinchingbrooke with Mr. Nabarro as teller.

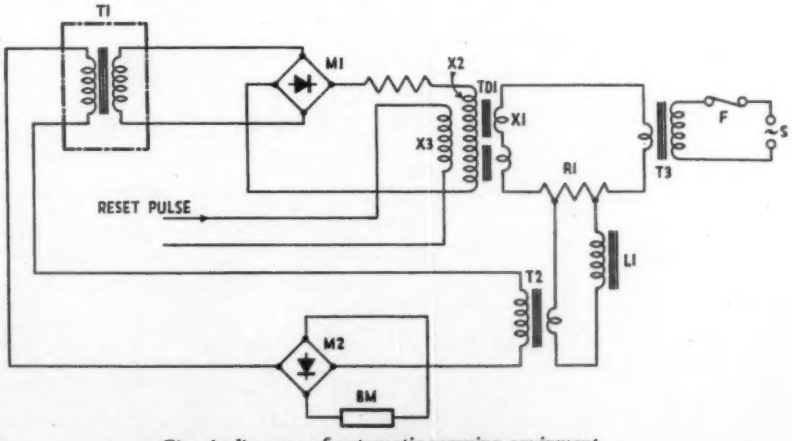
Automatic Warning Equipment

To reduce the number of electro-mechanical relays required in locomotive equipment for automatic warning systems, the Westinghouse Brake & Signal Co. Ltd. has developed a circuit in which transductors perform several switching and other functions. The relevant patent specification* has recently been published and describes how the equipment would operate in conjunction with the track magnets characteristic of the British Railways automatic warning system (A.W.S.).

The circuit has two stable states and is triggered from one to the other by the effect of the track magnets on the locomotive receiver transformer (T1 in the accompanying drawing showing the basic principles of the system). T1 is part of a feedback loop which in normal circumstances maintains sufficient ampere-turns in the control winding X2 of transductor TD1 (supplied with d.c. from rectifier M1) for winding X1 of this transductor to give its full output current. This is derived through transformer T3 from an a.c. supply in the locomotive. The current in the feedback loop, which maintains this stable state, is sufficient to energise brake magnet BM *via* rectifier M2, and is derived from the voltage developed across load resistor R1 by the supply current.

Operation of Equipment

When the locomotive receiver passes over a permanent magnet in the track, the pulse of magnetic flux saturates T1 so that the current in its secondary falls almost to zero, producing a similar collapse of the current in transductor control winding X2. The



Circuit diagram of automatic warning equipment

impedance of X1 increases, and the current in the L1, T2, R1 circuit falls correspondingly. Choke L1 has a non-linear characteristic so that it presents a high impedance to low currents. Consequently, when T1 emerges from the permanent magnet flux, the feedback loop remains quiescent because of the high impedance of L1 in its input. The brake valve is released and the brakes will be applied unless the circuit is reset to its other stable state.

Resetting may be accomplished by two methods. There is a resetting coil in the locomotive receiver, and if the electro-magnet in the track is energised (signal "off") a pulse is applied to transductor winding X3 which reduces the impedance of X1 and allows normal current to flow again from the supply. This allows choke L1 to revert to its low-impedance state and the feedback loop again maintains full output from X1, at the same time re-energising BM and releasing the brakes. Alternatively the reset pulse may be applied manually by the driver in order to take over control of the braking himself if the signal is at caution or "on," and the track magnet de-energised in consequence.

The specification also describes the use of transductors as relays for operating the audible cab signals.

*Patent No. 830,144

Contracts and Tenders

British Railways, Eastern Region, has placed the following contracts:—

W. & C. French, Limited: reconstruction of second portion of overbridge No. 19, Rainham Road South, at Dagenham East Station

Charles R. Price: reconstruction of engine pit, Crimpsall engine repair shop, Doncaster Works

George Simpson (London) Limited: renewal of roof coverings and gutters at Cheshire Street (Hare Street), Stables, E.C.2

W. & C. French Limited: construction of extensions to both up and down platforms including cleaning site and provision of fences and drainage at Bush Hill Park, Stamford Hill, and Rectory Road Stations

Leonard Fairclough (London) Limited: reconstruction of underline bridge No. 260 over River Gipping between Claydon and Needham

Wellerman Bros. Ltd.: roof repairs to locomotive shed at Frodingham Motive Power Depot.

The Export Services Branch, Board of Trade, has received calls for tenders as follow:—

From Ceylon

17 carriage underframes 55 ft. for 5-ft. 6-in. gauge

34 bogies 5-ft. 6-in. gauge.

The issuing authority and address to which bids should be sent is the Chairman, Tender Board, Ministry of Transport & Power, P.O. Box 547, Colombo, The closing date is May 18, 1960. The Board of Trade reference is ESB/10167/60.

From Pakistan:

13 axles for steam locomotives.

386 tyres for steam locomotives.

The issuing authority and address to which bids should be sent is the Chief Controller of Stores, N.W. Railway, Empress Road, Lahore. The tender No. is 210-S/1-X (PIL). The closing date is May 19, 1960. No further information is available at the Board of Trade. The Board of Trade reference is ESB/9748/60.

8 items of steel tyres.

The issuing authority and address to which bids should be sent is the Chief Controller of Stores, Eastern Bengal Railway, Pahartali, Chittagong. The tender No. is P6/EA1/BG/1/60/ACST. The closing date is April 28, 1960. No further information is available at the Board of Trade. The Board of Trade reference is ESB/9745/60.

From Sudan:

2 goods sheds for Port Sudan.

The issuing authority and address to which bids must be sent is the Controller of Stores, Sudan Railways. The tender No. is 2138. The closing date is May 16, 1960. Prices should be quoted on both f.o.b. and c.i.f. Port Sudan basis and tenders must be accompanied by a 2 per cent deposit. No urther information is available at the Board of Trade. The Board of Trade reference is ESB/9780/60.

Further details relating to the above tenders together with photo-copies of tender documents, unless otherwise stated, can be obtained from the Branch (Lacon House, Theobald's Road, W.C.1).

Notes and News

Technical Books Presented by Philips Electrical Limited.—Through a deed of covenant presented by Philips Electrical Limited to Holborn Borough Council, new technical books to a value of £200 are to be provided during each of the next seven years for the Holborn Central Library. The books will be mainly for the use of students in the electrical industry.

Royal Society of Arts.—A paper is to be given at the Royal Society of Arts, John Adam Street, Adelphi, W.C.2, on May 4, at 2.30 p.m. entitled "Future developments of the internal system of transport," by Mr. D. L. Munby, Reader in Economics and Organisation of Transport, Nuffield College, University of Oxford. Major-General G. N. Russell, Member of the British Transport Commission and Chairman, Eastern Area Board, will preside.

Leeds-Sheffield Diesel Service.—On April 19 the North-Eastern Region British Railways, introduced a through service of diesel multiple-unit trains between Leeds and Sheffield via Wakefield and Barnsley. Previously passengers to and from Sheffield had to change stations at Barnsley. On weekdays there are now at least 12 through trains via Barnsley in each direction. The new service reduces the throughout journey time by several minutes. It has been made possible by the construction of a junction between the former Great Central and Midland lines at Quarry Junction, Barnsley.

Full Order Books for Birmingham Railway Carriage & Wagon Co. Ltd.—Sir Bernard Docker, Chairman of the Birmingham Railway Carriage & Wagon Co. Ltd., has pointed out in his annual statement that production of locomotives continues to expand and that in 1959 their sales value for the first time exceeded those of other products. Order books for locomotives have been filled until early 1962 and the company is fully committed for carriages for roughly 12 months, but Sir Bernard Docker states that he would now like to see some further prospects of orders for carriages for the following period. The wagon position still shows no indication of any improvement. The results of the valuation of fixed assets of the company are expected to be available in the next few weeks. The board is awaiting the valuation result before making any recommendation on the merger offer from Charles Roberts & Co. Ltd.

Visitors to Britain in February.—The British Travel & Holidays Association has announced that overseas visitors arriving in Britain in February totalled 52,060, 20 per cent more than in the same month last year. United States visitors during the month numbered 9,990, 26 per cent more than in February, 1959. European visitors in February totalled 24,550, an increase of 14 per cent on 1959.

Railway Students' Association Annual Convention.—The annual convention of the Railway Students' Association will now take place from September 26 to October 1, with headquarters at Hanover, and not from May 12 to May 18 as stated in our issue of March 11. Details of the programme, which will include a paper by a principal officer of the German Railways and a number of visits to transport installations, will be circulated as soon as possible.

Miniature Buffets in Long-Distance Trains.—Miniature buffet cars are being placed in service as they come out of workshops, in long-distance trains of British Railways, Scottish Region, including the "Starlight Special" trains run during the season between Glasgow and Edinburgh and London, in conjunction with the London Midland Region. Miniature buffet cars, in which the buffet is in the centre of an open second class coach, have been normally confined hitherto to trains running over shorter distances.

International Plastics Exhibition.—The sixth International Plastics Exhibition and Convention will be held at Olympia, London, June 21–July 1, next year. The available floor space has been increased to over 300,000 sq. ft. to cater for many applications received from new exhibitors. The exhibition will cover all aspects of the industry, and fully representative displays of all types are expected from many countries. Full details can be obtained from the organiser: Mr. John L. Wood, Dorset House, Stamford Street, London, S.E.1.

Colour-light Signals in the N.E. Region.—The new colour-light signalling recently installed by the North Eastern Region of British Railways on the 13-mile stretch of the East Coast main line between Tweedmouth South Signalbox and Belford Craig Mill Signalbox to replace the old semaphore signals, was brought into use on April 10. This completes the first stage of the scheme to install colour-light signalling along the 71-mile stretch of main line between Newcastle Heaton and Burnmouth, six miles north of Berwick. The line has also been equipped with the Automatic Warning System which was brought into use with the new signals

Sixth Stage of London Transport Trolleybus Conversion.—The London Transport Executive has announced that five trolleybus routes in the Lea Valley area are to be replaced by 64-seater Routemaster diesel buses under Stage VI of the £10,000,000 trolleybus conversion scheme, which comes into effect on April 27. The trolleybus services affected are routes 623 (5·75 route miles), 625 (9·35 route miles), 687 (8·05 route miles), 697 (9·58 route miles) and 699 (9·5 route miles) serving the Chingford, Walthamstow, Leyton, Stratford, Plaistow, and Victoria Dock areas to the east of the River Lea and the Winch-

more Hill, Palmers Green, Wood Green, Manor House, and Tottenham areas to the west.

Clayton Dewandre Co. Ltd. Results.—The group net profit for 1959, of the Clayton Dewandre Co. Ltd. was £283,763 (£151,066) and the dividend equivalent to 12½ per cent (10). Net assets were £2,908,939 (£2,458,593). Net current assets were £1,768,116 (£1,706,250). Commitments were £185,105 (£23,535).

Opening of Kingsferry Bridge.—The new Kingsferry lifting bridge, providing an improved road and rail connection between the Isle of Sheppey and the mainland of Kent was officially opened by the Duchess of Kent last Wednesday. The guests at the opening ceremony included Messrs. K. W. C. Grand, Member of the British Transport Commission; C. P. Hopkins, General Manager; P. A. White, Acting Assistant General Manager, Traffic; and Arthur Edwards, Assistant to Operating Officer, British Railways, Southern Region.

Rail Excursions for Glasgow Spring Holiday.—Among the many features of the programme of cheap rail excursions arranged for Glasgow, Lanarkshire and district Spring holidaymakers are diesel train land cruises to the Six Lochs; restaurant car day excursions to Forfar, Stonehaven and Aberdeen; to Carlisle; and to Fort William and Mallaig; and augmented Clyde Coast sailings. Additional long distance trains will serve London, Liverpool, Manchester, York and Newcastle, while many relief trains will run to the Clyde and Ayrshire coasts, Edinburgh, Aberdeen and other Scottish resorts.

A.E.I. and Reyrolle to Share Interest in A. Parsons.—Associated Electrical Industries Limited is reported to be acquiring, on a share exchange basis, half the 40 per cent equity interest which A. Reyrolle & Co. Ltd. holds in C. A. Parsons & Co. Ltd. This represents a transaction of some £4,000,000.

Asquith Machine Tool Corporation Limited Results.—The trading profit of the Asquith Machine Tool Group for the year ended September 30, 1959 before taxation, was £563,475 compared with £815,105 for the previous year. The net profit, after providing for taxation, attributable to the shareholders of the Corporation was £282,447 as compared with £369,017 for the previous year.

Eastern Region Target for Increased Freight Traffic.—Last year, the Eastern Region, British Railways, carried nearly 1,000,000 tons more freight than the year before. This year, it doubled the target to 2,000,000 more tons. Results for the first quarter indicate that this target should be reached. For the first 13 weeks, this year, freight tonnage shows an increase of 1,367,500 tons. The present policy of quoting competitive rates and improving freight services is showing results. Many new accounts have been won and there is evidence that the Region's modernisation and new commercial approach are producing results. Total traffic receipts including passenger receipts, improved by nearly £1,000,000 during the quarter.

Swedish Ball Bearing Co. Ltd. Results.—The Swedish Ball Bearing Co. Ltd., is maintaining its dividend at Kr. 12 per share for 1959, and proposes a one-for-three scrip issue. Net sales amounted to Kr. 470,400,000 (439,400,000). Ordinary depreciation on plant and property was Kr. 33,200,000 (27,760,000). Additional depreciation on buildings amounting to Kr. 5,400,000 has been charged to trade equalisation accounts. After transferring Kr. 3,400,000 (21,000,000) to pension fund and Kr. 25,000,000 (10,000,000) to trade equalisation accounts and after Kr. 26,000,000 (26,900,000) for tax, the net profits were Kr. 38,900,000 (34,800,000). The reserve fund is increased by Kr. 15,600,000 to Kr. 62,400,000.

British Insulated Callender's Cables Limited Dividend.—British Insulated Callender's Cables Limited is maintaining its dividend at 13½ per cent with a final of 9½ per cent on the £18,847,988 capital as increased by the issue of shares against acquisitions. Group sales increased by £17,000,000 to £128,000,000, and the net profit rose from £3,292,989 to £4,231,569.

Two-Tier Covered Motorcar Transporter.—The first covered two-tier vehicle for transporting motorcars by rail is being produced by the engineering division of Newton Chambers Limited. The vehicle is being made at the request of the British Transport Commission. It will be a new version of the company's open two-tier car transporter. For the first time, reinforced glass fibre will be used to make the complete body. The Eastern Region of British Railways has ordered 14 of these new transporters, for use with the carsleeper service it operates between Kings Cross and Perth.

Fibreglass/Plastic Container in N.E. Region.—British Railways, North Eastern Region, has introduced an experimental fibreglass/plastic container. The load is 5 tons, one ton more than that of the largest container of the conventional types. The dimensions are 7 ft. 6 in. x 6 ft. x 6 ft. The weight is only one-half that of a wooden container of the same size. The container can be modified for handling by fork-lift truck, and can be stacked. It is stated to be proof against damp, corrosive substances, and vermin. The design and manufacture were by Willerby Plastics Limited.

Rolls-Royce Engine Exchange Scheme.—For users of its railway-traction diesel engines in Great Britain and Northern Ireland a scheme has been started by Rolls-Royce Limited to enter into arrangements for the supply of fully-reconditioned and guaranteed engines for exchange on demand. This can save capital expenditure for the holding of spare engines and parts in stock, it can reduce the work of storekeeping and stock control, and in many cases should be found cheaper as well as more convenient compared with the cost of overhaul in individual workshops. Fourteen days are allowed for the return of the used engine after despatch of a reconditioned unit from the Rolls-Royce works at Shrewsbury.

A.E.T. Easter Vacation Course for Sixth-Formers.—An Easter vacation course for schoolboys and schoolgirls from public and grammar schools throughout Britain was held at the Trafford Park Works of Associated Electrical Industries (Manchester) Limited on April 4–8. It was attended by 45 sixth-formers. The course included progressive practical training in the Apprentice Training School, with visits to manufacturing departments and design laboratories. Senior members of the staff engaged on research, design, manufacture, and sales described their work and the opportunities in electrical and mechanical engineering. These talks were illustrated by films. There were also evening visits to the company's Wythenshawe Factory, the Apprentice Club, "Kenwood," and the Manchester Opera House. The boys and girls were able to obtain advice on careers and other matters from the Manager of the Education Department and members of his staff.

Mechanical Handling Exhibition.—Mr. Reginald Maudling, President of the Board of Trade, will open the Mechanical Handling Exhibition at noon on May 3. Some of the equipment to be shown was described briefly in last week's issue. Exhibitors and buyers will have at their disposal a full-scale Post-Office Telex installation, offering them direct teleprinter contact with world markets, and combining the speed of the telephone with the authority and accuracy of the printed word.

New Notting Hill Gate Underground Station Nearing Completion.—The London Transport Executive has stated that work is up to schedule on the final stages of the new £1,000,000 Underground Station at Notting Hill Gate, due to be finished this summer. The new station links the Circle and Central lines under one roof and has cut out the busy street crossing for the 12,000 passengers a day who interchange between these two lines. The new below-street booking hall, with its pavement entrances, and two flights of escalators are already in use. Machinery for the third and last escalator leading to the eastbound Central Line 100 ft. below street level is now being installed and work starts in the next few days on a major reconstruction for the two Central Line platforms.

British Transport Advertising Stand at Advertising Services Exhibition. — British Transport Advertising, the Commercial Advertising Service of the British Transport Commission, is to be represented at the first Advertising Services Exhibition being held in the New Exhibition Hall at Harrogate from May 3 to 7. Coloured pictorial displays showing the variety of sites available will support the central theme of "British Transport Advertising — The Progressive Medium for the Modern Advertiser." Features include a cut-out map illustrating the areas served by the British Transport Commission's 21 Provincial and Scottish bus fleets, and displays showing British Transport Advertising sites on Underground and British Railways stations as well as on delivery vans. The sales promotion magazine of the Commercial Advertising Service, *Transad News*, and other literature will be available on the stand where British Transport Advertising representatives will be in attendance to answer inquiries from advertisers and agents.

Sunday Opening of Glasgow Central Station Resumed.—Glasgow Central Station, British Railways, Scottish Region, is now open again on Sundays. The Sunday services which were altered last October to depart from and arrive at St. Enoch or Buchanan Street have reverted to Central and destinations served from that station are as on weekdays. St. Enoch Station remains open on Sundays for trains to and from Largs, Fairlie, Ardrossan, Ayr, Girvan, Stranraer, Kilmarnock, Dumfries, Annan, Carlisle, Leeds, and London St. Pancras. Buchanan Street Station is closed on Sundays until May 15 inclusive. All Sunday trains to and from Larbert, Stirling, Perth, Dundee and the north on Sundays depart from and arrive at Queen Street Station, including the 7.35 a.m. from Glasgow to Aberdeen and Inverness which recently departed from Buchanan Street. From May 22 all these services will leave from and arrive at Buchanan Street as on weekdays.

Increase in Machine Tool Orders.—Manufacturers of machine tools report a sharp rise in orders in January. Stocks of the more standard types, which many manufacturers were still building for stock six months ago, are stated to have been largely cleared, In the middle of 1959 the value of orders.

despite a lower rate of deliveries, had been reduced to a little over £49,000,000. By the end of the year it had increased to £55,800,000. In January, a further £3,000,000 worth of work was added.

Central Wagon Co. Ltd. Dividend.—The Central Wagon Co. Ltd. is to pay, on May 5, a tax free capital dividend of 2s. on each 10s. stock unit.

Massey-Ferguson Equipment at the Mechanical Handling Exhibition.—Massey-Ferguson Industrial Equipment to be exhibited at the Mechanical Handling Exhibition will include the 702 industrial tractor, fitted with a 702 front-mounted shovel and a 710 rear-mounted digger. A selection of alternative buckets and other attachments also will be displayed. In addition the 35 semi-industrial tractor will be shown. It will be fitted with a front-mounted loader and a rear-mounted forklift of one-ton capacity. The forklift is fitted with a special towing hook so that it can be coupled automatically to a three-ton tipping trailer.

United Kingdom—Czechoslovak Trade Arrangement.—A new three-year United Kingdom—Czechoslovak trade arrangement was signed in Prague on April 13. The new arrangement replaces the three-year trade arrangement which was due to expire on December 31, 1959, but which was extended to April 30, 1960. As in the past, the new arrangement provides for the establishment of annual quotas for trade in each direction. Revised quota lists for the year 1960 have also been negotiated to supersede the interim quota arrangements which had been made for the first four months of the year. The quota lists make provision for Czechoslovak purchases during 1960 of some £5,300,000 worth of United Kingdom goods, including machinery, chemical plant, chemicals, plastics, motorcars and textile manufactures. The quota lists also provide for the issue of United Kingdom import licences for Czechoslovak goods up to a total of some £7,300,000. This is additional to the trade in goods which can, under United Kingdom import licensing regulations, be imported from Czechoslovakia and other countries without specific import licence.

Forthcoming Meetings

April 25 (*Mon.*).—Institution of Railway Signal Engineers, Bristol Section, at Temple Mead Station, Bristol, at 6 p.m. Annual general meeting, followed by a paper on "Single line working,' by Mr. J. V. Nicholson, British Railways, Western Region.

April 26 (*Tue.*) to April 29 (*Fri.*).—Institute of Transport 1960 Congress in London.

April 26 (*Tue.*).—Institution of Locomotive Engineers, at the Institution of Mechanical Engineers, 1, Birdcage Walk, Westminster, S.W.1, at 5.30 p.m. Paper on "Steel wheels and tyres," by Mr. C. F. Ryan, and Mr. B. B. Hundy.

April 26 (*Tue.*).—Railway Correspondence Travel Society, East Midlands Branch, at the Thurland Hall (Pelham Street entrance), Nottingham, at 7.10 p.m. Paper on "London & South Western Suburban," by Mr. R. E. Tustin.

April 28 (*Thu.*).—The Permanent Way Institution, Nottingham & Derby Section, in the Victoria Station Hotel, Nottingham, at 6.30 p.m. Paper on "Some problems of a Works Inspector," by Mr. E. Holton, Works Inspector, Melton Mowbray.

April 28 (*Thu.*).—Institute of Transport, at the Dorchester Hotel, Park Lane, W.1, at 7.15 for 8 p.m. Annual dinner.

April 29 (*Fri.*).—Crewe Pupils & Apprentices' Association dinner at the Royal Automobile Club, Pall Mall, S.W.1.

April 30 (*Sat.*).—Railway Correspondence & Travel Society, at the Windsor Castle, Vauxhall Bridge Road, S.W.1, annual dinner.

May 4 (*Wed.*).—Permanent Way Institution, Nottingham & Derby Section. All-day tour of London Docks.

May 5 (*Thu.*).—Model Railway Club, at Keen House, Calshot Street, King's Cross, N.1, at 7.45 p.m. A talk on "The Southwold Railway," by Mr. E. R. Boston.

May 5 (*Thu.*).—Railway Correspondence & Travel Society, Sheffield Branch, at Livesey-Clegg House, Sheffield, at 7.30 p.m. Paper on "Railway transportation in France during the second world war," by Mr. J. Blundell.

May 6 (*Fri.*).—The Railway Club, at the Royal Scottish Corporation, Fetter Lane, E.C.4, at 7 p.m. Paper on "Modern railway signalling developments," by Mr. P. Broadley.

May 13 (*Fri.*).—Permanent Way Institution, East Anglia Section. Visit to Edgar Allen & Co. Ltd., Sheffield.

May 14 (*Sat.*).—Permanent Way Institution, London Section. Visit to new carriage depot at Ilford, Essex.

May 16 (*Mon.*).—Historical Model Railway Society, at Caxton Hall, Westminster, S.W.1, at 7 p.m. "The Dartmouth & Torbay Railway," historical description by Mr. I. H. Smart.

May 21 (*Sat.*).—Railway Correspondence & Travel Society, South of England Branch, at the Junction Hotel, Eastleigh, at 6.30 p.m. Paper on "Some footplate experiences," by Mr. A. F. Cook.

OFFICIAL NOTICES

THE LONDON SCHOOL OF ECONOMICS AND POLITICAL SCIENCE

APPLICATIONS are invited for appointment from 1 October, 1960, or as soon as possible thereafter to a Rees Jeffreys Research Fellowship in Transport. The Fellow appointed will be required to pursue with a view to publication research within the field of the Fellowship, which is defined as the economics, administration, organisation and regulation of transport (which includes air and sea transport as well as inland transport). Salary within the range £2,000—£2,950 a year, with superannuation benefits and family allowances; tenure for three years in the first instance, but with the possibility of renewal for maximum of seven years in all. Provision has been made for any necessary travel expenses of the Research Fellow and for research assistance.

Further particulars should be obtained from the Secretary, London School of Economics and Political Science, Houghton Street, London, W.C.2, by whom applications should be received not later than 14 May, 1960.

EXPORT: Large Engineering Export Group based in London have opening for training young Salesman with possibility of periodic overseas travel later. Also opening for young but fully experienced Assistant to Export Sales Manager. Applications will be treated in strict confidence. Reply, giving particulars about yourself, indication of commencing salary desired, and full details of your experience and enclosing snapshot, which will be returned, to Messrs. F. W. Stephens, Chartered Accountants, 15, Eldon Street, E.C.2, marking envelope in left-hand corner: "Export."

Railway Stock Market

Reactionary conditions again prevailed in stock markets because of uncertainty as to measures likely to be taken by Mr. Heathcoat Amory to restrict expansion of credit. A higher bank rate is considered unlikely in the City, where it is felt the Chancellor will prefer to take special steps to force the banks to make some reduction in new loans. A return of hire purchase controls is another possibility. There have been falls of several shillings in some leading industrial shares, but caution by buyers, rather than selling, was the main reason. Restriction of new lending by the banks is likely to result in many companies raising more capital by new issues, and these will be awaited with considerable interest. Any big expansion in new issues will tend to reduce the volume of money available for investment in existing stocks and shares. The biggest share issue for some time will be the offer back to the public of shares in Richard Thomas & Baldwins, the large steel company which has not yet been de-nationalised.

There was only very limited business in foreign rails, which showed few price changes. Antofagasta was 13¾ with the preference stock rather firmer at 28 and the 5 per cent (Bolivia) debentures again quoted at 100; the 4 per cent perpetual debentures were 44½.

Mexican Central "A" bearer debentures were 57½, United of Havana second income stock 6 and Sao Paulo Railway 3s. units again changed hands around 1s. 4½d.

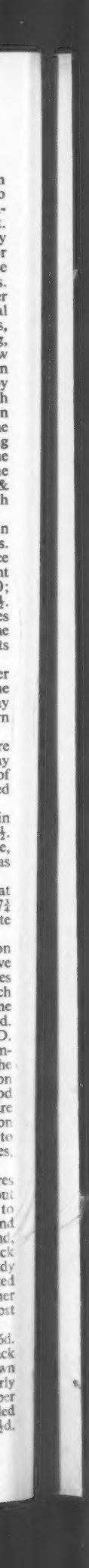
Costa Rica ordinary stock has been firmer at 30, with the first debentures 90 and the second debentures 94½. Brazil Railway bonds were quoted at 7 and Chilean Northern first debentures at 57.

International of Central America were $25½ with the preferred $111½. Paraguay Central prior debentures had a quotation of 15½, while Guayaquil & Quito assented bonds were 77.

Nyasaland Railways shares were again 10s. with the 3½ per cent debentures 51½. Barsi stock was quoted at 17, and elsewhere, West of India Portuguese capital stock was 112 with the 5 per cent debentures 93½.

Canadian Pacifics have been firmer at $47¼; the 4 per cent preference were 57¾ and the 4 per cent debentures 63⅝. White Pass shares were $13¾.

In the engineering and kindred section Beyer Peacock 5s. shares at 8s. 1½d. have been inclined to strengthen, but Charles Roberts 5s. shares eased to 13s. 9d. at which there is now a yield of 5¼ per cent on the basis of last year's 15 per cent dividend. Westinghouse Brake were 50s. 6d., G. D. Peters 20s., N.B. Locomotive 10s. and Birmingham Wagon 40s. 7½d.xd. Shares of the latter are firmly held because the revaluation of properties is expected to show a good surplus which could mean the shares are moderately priced. After easing, Wagon Repairs 5s. shares strengthened a little to 11s. 6d. Gloucester Wagon 10s. shares, however, lost a few pence at 12s. 4½d.

Elsewhere, Edwards High Vacuum shares strengthened to 22s. 3d. on the results, but there has been a sharp fall in Vickers to 32s. 7½d., Guest Keen declined to 87s., and elsewhere, reflecting the general trend, Acrow (Engineers) 5s. shares moved back to 70s. Carrier Engineering were steady at 63s. 9d., but Davy United were marked down sharply to 107s. 6d., and in other directions, Broom & Wade 5s. shares lost a few pence at 18s. 7½d.

Dowty Group 10s. shares were 34s. 6d. and Pressed Steel 5s. shares have come back to 36s. 9d. Associated Electrical were down to 50s. 4½d. at which there is a yield of nearly 6 per cent on the basis of last year's 15 per cent dividend. English Electric receded to 40s. and General Electric to 38s. 10½d.